

Appendix 7-E

SLOPE STABILITY ANALYSIS

SEDIMENTATION POND "A"

SLOPE STABILITY ANALYSIS
ON
EMBANKMENT OF SEDIMENTATION POND "A"
BEAR CREEK CANYON MINE SITE
CO-OP MINING COMPANY

JULY 1984



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SECTION 1

In conjunction with the redesign of sedimentation pond "A" of the Bear Creek Canyon Mine site, various in place and laboratory soil tests were performed. Using the parameters obtained from these tests, slope stability analysis were performed to confirm the stability of the 2H:IV interior slope and determine a stable angle for the exterior slope.

SECTION II CONSTRUCTION

On September 29, 1983, I visited the site in conjunction with Wendell Owen of the Co-Op and reviewed in detail the provisions taken at the site during construction. I also reviewed with Mr. Owen the construction procedures which enabled me to determine how the embankment was constructed to its present slope.

SECTION III MATERIAL TESTING

While at the site, using a Troxler 3411B nuclear density gauge, I determined the in-place density of the embankment material. I also obtained moisture density samples and samples of the embankment material, which I returned to the lab for additional testing. The results of these in-place determinations indicate that the average in-place density of the material varied from 89% to 94% of the laboratory obtained T-99 standard proctor.

I submitted a sample of the embankment material to Chen and Associates, a consulting soil and foundation engineering firm, to determine the relationship of the loading to shear stress, and to determine the internal cohesion. These results are included in the Appendix. The material gradation results are also included in the Appendix. The gradation results indicated that the material is free draining confirming the on site tests.

SECTION IV OCCURRENCE OF GROUND WATER

The results of the gradation analysis indicate that the material is free draining. This was further observed at the site through reviewing the existing material in place and performing percolation tests in the embankment. Because of the geology of the mine plan area the embankment is not effected by ground water, but for purposes of analysis the soil was assumed saturated by the water occasionally held in the pond. This assumed extent of saturation provides for conservative results.

SECTION V FACTOR OF SAFETY

A computer model was constructed to analyze the stability of the embankment and the following conditions were assumed.

1. The soil below the maximum water elevation on the interior slope to the toe of the exterior slope (soil #2) was assumed saturated.
2. In-place soil density of 118 pounds per cubic foot.
- 3 2H:IV angles were used for both interior and exterior slopes.

A computer simulation was then applied to this situation to determine various failure planes. The "Method of Slices" is the basis for the modified Bishop method computer program. Various failure planes were investigated to determine a minimum factor of safety. The results of these computer runs and a copy of the computer listing is attached in the Appendix. The results of these computer simulations indicate that the minimum factor of safety with a .1 g earthquake loading is 3.8 for the interior slope and 2.8 for the exterior slope at the point of maximum length.

SECTION VI CONCLUSIONS

In conclusion the sedimentation pond "A" embankment as now existing is:

1. Free draining.
2. No water was encountered in test holes dug in embankments.
3. No movement of the embankment has been detected.
4. The computer simulation on failure planes indicates that the factor of safety is at least 2.8 with a 0.1 g earthquake loading for 2H:IV slopes for both the interior and exterior of the embankment.

APPENDIX

ENGINEERS

Project Name CONE MINE Date 10/6/52
 Station or Pit Location _____
 Sample No. #7 Requested by FW
Native material, pond dikes

AS RECEIVED GRADATION

Screen Size	Weight (g)	Percent Retained	Percent Passing	SPECS.
3"				
2"	0	0	100%	
1 1/2"	1132.1	14.0	86.0	
3/4"	875.8	10.9	75.1	
1/2"	466.3	5.8	69.3	
3/8"				
#4	1112.1	13.8	55.6	
Wet Wt. #4				
Dry Wt. #4	448.1	55.6		
Dry Wt.	2069.0			

WASHED GRADATION AFTER CRUSHING (2500 GM. DRY SAMPLE)

Screen Size	Weight Retained	Percent Retained	Percent Passing	Total % Passing	SPECS.	MOISTURE DETERMINATION	
#8	141.7	8.9	91.1	19.7			- #4
#10	31.1	2.0	89.1	17.9		Container & Wet Soil Weight (gm.)	
#16	69.5	4.4	84.7	17.5		Container & Dry Soil Weight (gm.)	
#20	40.7	2.6	82.2	16.7		H ₂ O Loss	
#30	31.8	2.0	80.1	16.2		% Moisture	
#40	47.9	3.0	77.1	15.8		A.A.S.H.O Classification	
#50	91.4	5.9	71.4	15.2			
#100	350.2	22.1	49.3	14.0			
#200	146.4	9.2	40.1	9.7			
#200	635.7	40.1	0			Wt. before washing	
						Wt. after washing	
Total Wt	1586.8						

COPIES TO:

Tested by KIRL I. J. [Signature]

ENGINEERS

Project Name Low Mine Date 10/6/8
 Project No. _____ Station or Pit Location _____
 Sample No. 21 (60% Intermix) Requested by WJH
2 sediments in sand

AS RECEIVED GRADATION

Screen Size	Weight (g)	Percent Retained	Percent Passing	SPECS.
3"				
2"				
1"	0	0	100%	
3/4"	63.0	0.9	99.2	
1/2"	94.7	1.2	98.8	
3/8"	---	---	---	
#4	31.1	3.9	96.1	
Wet Wt. #4	---	---	---	
Wt. #4	7654.4	94.1		
Total Wt Dry	8131.9			

WASHED GRADATION AFTER CRUSHING (2500 GM. DRY SAMPLE)

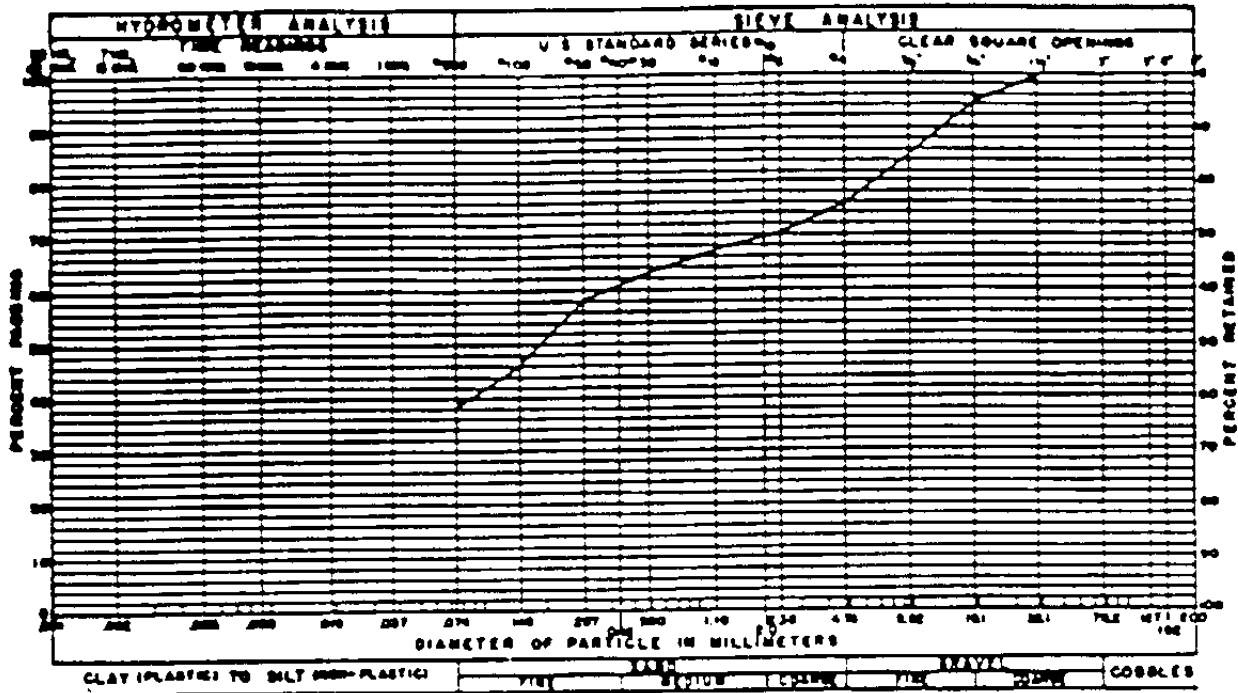
Screen Size	Weight Retained	Percent Retained	Percent Passing	Total % Passing	SPECS.	MOISTURE DETERMINATION	
#8	126.3	8.5	91.5	18.3			- #4
#10	37.6	2.5	97.5	16.8		Container & Wet Soil Weight (gm.)	
#16	121.7	8.2	91.8	16.3		Container & Dry Soil Weight (gm.)	
#20	79.7	5.4	94.6	14.8		H ₂ O Loss	
#30	60.4	4.1	95.9	13.8		% Moisture	
#40	67.1	4.5	95.5	13.1		A.A.S.H.O Classification	
#50	95.3	6.4	93.6	12.3			
#60	128.3	22.1	77.9	11.1			
#100	113.2	7.6	92.4	7.0			
- #200	457.0	30.8	0			Wt. before washing	
						Wt. after washing	
Total Wt	1487.1						

COPIES TO:

KIPP L. F. RECORD

CHEN AND ASSOCIATES

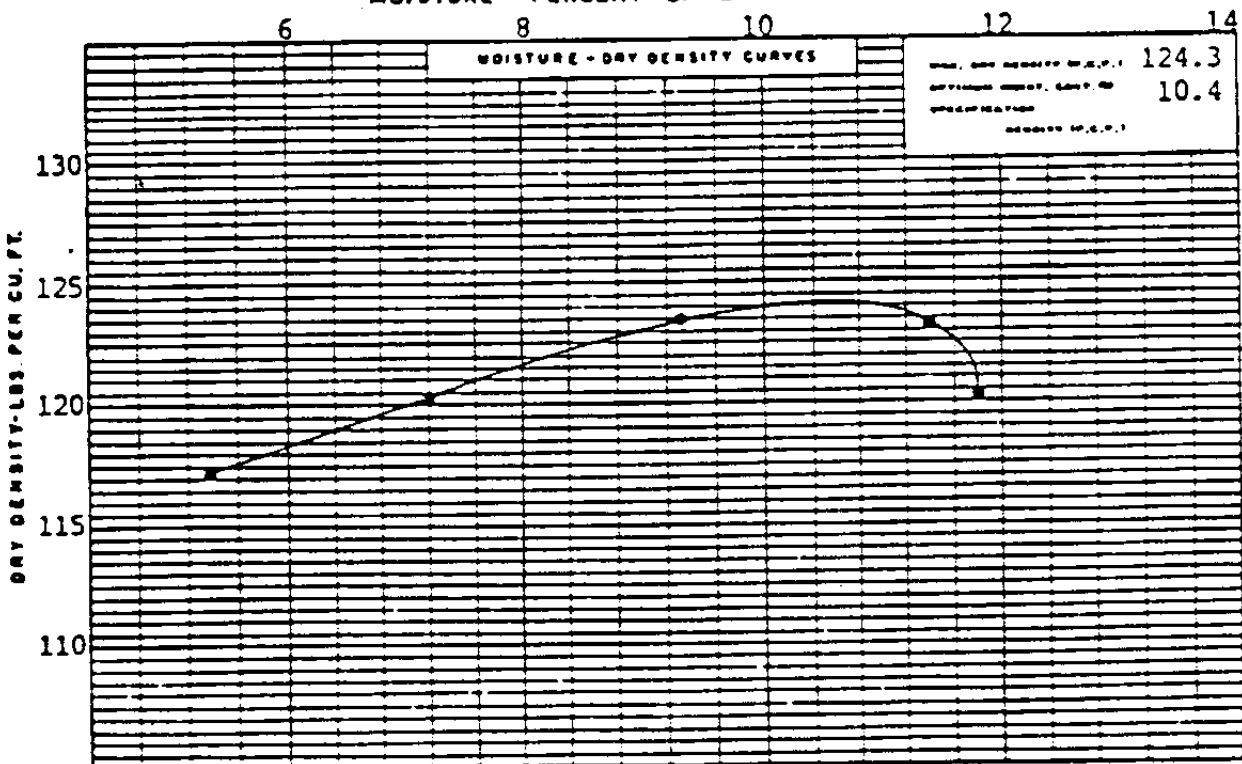
Consulting Engineers
Soil and Foundation Engineering



GRADATION TEST RESULTS

GRAVEL 25 % SAND 37 % SILT AND CLAY 38 %
LIQUID LIMIT % PLASTICITY INDEX %

MOISTURE - PERCENT OF DRY WEIGHT



COMPACTION TEST RESULTS

COMPACTION TEST PROCEDURE ASTM D-698 Method C

SAMPLE OF Clayey Sand and Gravel

FROM

DEPTH

CHEN AND ASSOCIATES
Consulting Soil and Foundation Engineers

TEST NUMBER	1	2	3	4
LOCATION				
HEIGHT-INCH	.75	.75	.75	
DIAMETER-INCH	1.925	1.925	1.925	
WATER CONTENT - %	10.0	10.0	10.0	
DRY DENSITY - pcf	117.8	117.8	117.8	
CONSOL. LOAD - ksf	2.0	4.0	6.0	
NORMAL LOAD - ksf	2.0	4.0	6.0	
SHEAR STRESS - ksf	1.8	3.0	4.0	

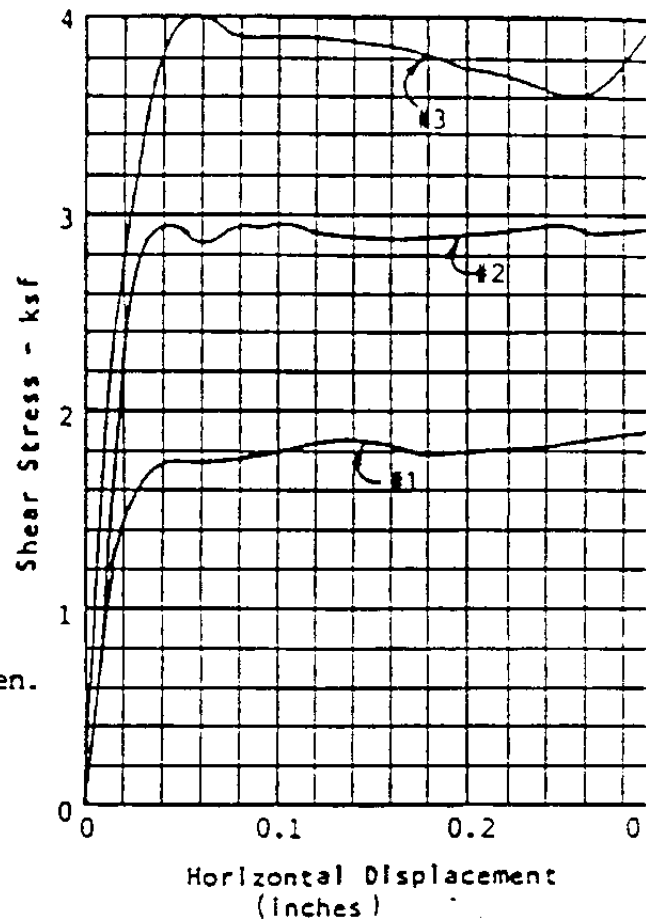
TYPE OF SPECIMEN Remolded @ 95% Std. Proctor Den.

SOIL DESCRIPTION Clayey Sand and Gravel

TYPE OF TEST Consolidated-Undrained

Saturated

Strain Rate 0.02 in/sec



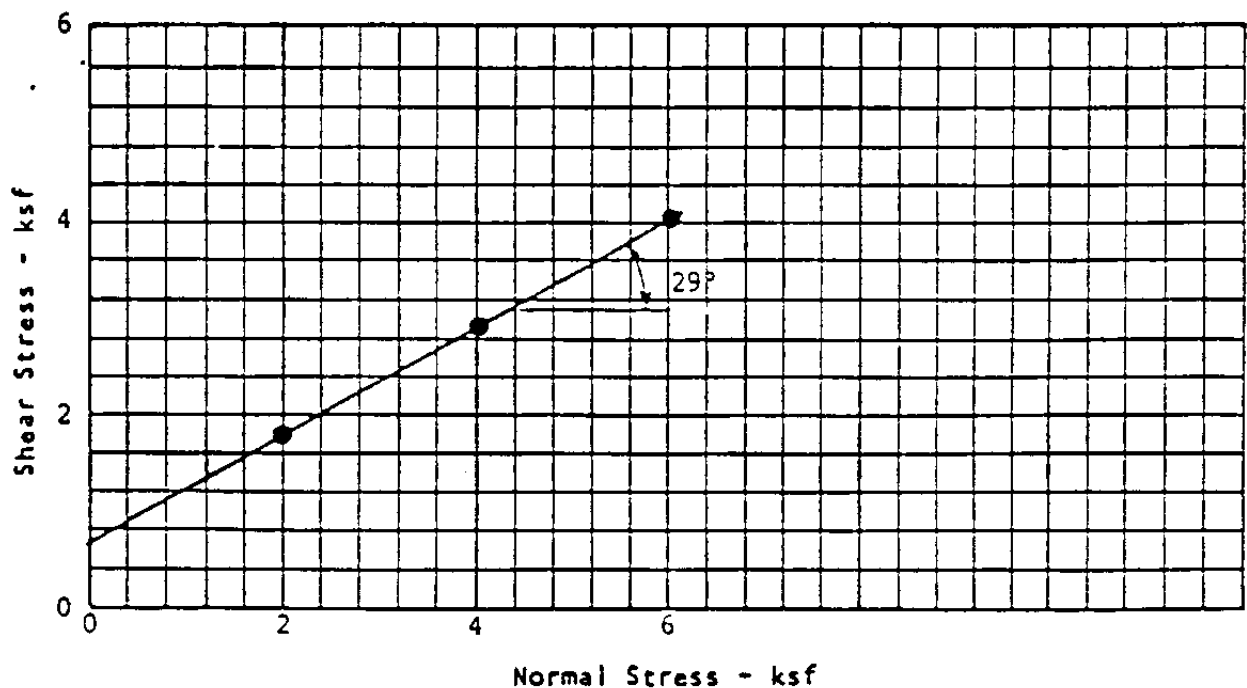
TAN ϕ

ϕ

COHESION - ksf

29°

0.7



SLOPE STABILITY ANALYSIS

for

CO-OP MINE - SLOPE STABILITY ** SEDIMENT POND A

DATA FILE: "CPSLOR:T14"

PROJECT NUMBER: 8309-42

by: EGN

WATER UNIT WEIGHT= 62.40

Interior Slope

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	108.0	94.0	10.0	4.57

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	255.8	-41.3	700	1.7	120.3	29	101.4
2	670.6	-29.1	700	1.7	315.4	29	103.2
3	994.6	-18.3	700	1.7	467.8	29	104.9
4	1248.6	-8.2	700	1.7	587.2	29	106.6
5	1441.1	1.7	700	1.7	677.7	29	108.3
6	1573.8	11.6	700	1.7	740.1	29	110.0
7	1642.9	21.9	700	1.7	772.6	29	111.7
8	1636.9	33.1	700	1.7	769.8	29	113.4
9	1527.4	46.0	700	1.7	718.3	29	115.1
10	702.7	58.1	700	.9	352.0	29	116.5
11	555.8	71.0	700	.9	326.0	29	117.4
12	69.9	83.6	700	.2	50.6	29	117.9

ITERATION	INITIAL	CALCULATED
1	1.0000	4.3859
2	4.3859	4.5570
3	4.5570	4.5669
4	4.5669	4.5674

FACTOR OF SAFETY= 4.57 AT X= 108 Y= 94 R= 10
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	Ø	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	110.0	98.0	10.0	5.71

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	Ø	X
1	119.8	-26.5	700	1.4	56.3	29	105.5
2	327.1	-17.9	700	1.4	153.8	29	106.9
3	497.2	-9.6	700	1.4	233.8	29	108.3
4	633.8	-1.6	700	1.4	298.1	29	109.7
5	738.4	6.5	700	1.4	347.2	29	111.1
6	810.3	14.6	700	1.4	381.1	29	112.5
7	846.8	23.1	700	1.4	398.2	29	113.9
8	842.0	32.1	700	1.4	396.0	29	115.3
9	571.3	40.6	700	1.0	294.8	29	116.5
10	514.1	48.8	700	1.0	320.2	29	117.5
11	423.2	59.6	700	1.1	331.7	29	118.6
12	94.5	72.3	700	.7	94.5	29	119.5

ITERATION	INITIAL	CALCULATED
1	1.0000	4.9462
2	4.9462	5.6651
3	5.6651	5.7085
4	5.7085	5.7108

FACTOR OF SAFETY= 5.71 AT X= 110 Y= 98 R= 10
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	104.0	98.0	10.0	10.14

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	35.5	-7.0	700	1.0	16.7	29	102.8
2	98.5	-1.5	700	1.0	46.3	29	103.7
3	150.9	4.1	700	1.0	71.0	29	104.7
4	192.6	9.6	700	1.0	90.6	29	105.7
5	223.2	15.3	700	1.0	105.0	29	106.6
6	242.0	21.1	700	1.0	113.8	29	107.6
7	247.7	27.2	700	1.0	116.5	29	108.6
8	238.3	33.6	700	1.0	112.1	29	109.5
9	210.4	40.6	700	1.0	99.0	29	110.5
10	158.0	48.4	700	1.0	74.3	29	111.5
11	68.2	57.8	700	1.0	32.1	29	112.4

ITERATION	INITIAL	CALCULATED
1	1.0000	8.2214
2	8.2214	10.0653
3	10.0653	10.1340
4	10.1340	10.1361

FACTOR OF SAFETY= 10.14 AT X= 104 Y= 98 R= 10
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	109.0	98.0	15.0	3.94

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	74.3	-39.9	700	1.2	34.9	29	99.4
2	632.5	-31.7	700	2.3	297.4	29	101.1
3	1249.7	-21.9	700	2.3	587.7	29	103.4
4	1748.2	-12.7	700	2.3	822.2	29	105.7
5	2145.1	-3.8	700	2.3	1008.8	29	108.0
6	2446.9	4.9	700	2.3	1150.8	29	110.3
7	2653.4	13.8	700	2.3	1247.8	29	112.6
8	2756.6	23.1	700	2.3	1296.4	29	114.9
9	2400.4	32.3	700	2.0	1233.4	29	117.0
10	2639.8	43.5	700	2.5	1569.2	29	119.3
11	1738.0	59.6	700	2.5	1277.1	29	121.8
12	209.5	75.7	700	.9	209.5	29	123.4

ITERATION	INITIAL	CALCULATED
1	1.0000	3.6937
2	3.6937	3.9291
3	3.9291	3.9432
4	3.9432	3.9440

FACTOR OF SAFETY= 3.94 AT X= 109 Y= 98 R= 15
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

Interior Slope

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	106.0	94.0	15.0	4.09

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	549.4	-54.2	700	2.4	258.4	29	93.9
2	1283.4	-40.2	700	2.4	603.6	29	96.4
3	1755.6	-28.9	700	2.4	825.7	29	98.8
4	2488.6	-18.2	700	2.7	1170.4	29	101.3
5	3099.3	-7.7	700	2.7	1457.5	29	104.0
6	3555.5	2.6	700	2.7	1672.1	29	106.7
7	3861.2	12.9	700	2.7	1815.9	29	109.3
8	4004.5	23.7	700	2.7	1883.3	29	112.0
9	3950.6	35.5	700	2.7	1857.9	29	114.7
10	2756.1	47.5	700	2.0	1400.7	29	117.0
11	1680.6	58.4	700	1.4	961.8	29	118.7
12	1178.1	73.0	700	1.4	768.7	29	120.1
13	48.8	84.9	700	.1	42.6	29	120.9

ITERATION	INITIAL	CALCULATED
1	1.0000	5.0280
2	5.0280	4.1140
3	4.1140	4.0898
4	4.0898	4.0892

FACTOR OF SAFETY= 4.09 AT X= 106 Y= 94 R= 15
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	Ø	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	105.0	101.0	15.0	4.90

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	Ø	X
1	3.3	-20.3	700	.4	1.5	29	99.8
2	182.2	-15.9	700	1.8	85.7	29	100.9
3	450.4	-9.0	700	1.8	211.8	29	102.7
4	672.6	-2.1	700	1.8	316.3	29	104.4
5	850.5	4.7	700	1.8	400.0	29	106.2
6	983.6	11.6	700	1.8	462.6	29	108.0
7	1069.7	18.6	700	1.8	503.0	29	109.8
8	1103.5	26.0	700	1.8	519.0	29	111.6
9	1076.2	33.8	700	1.8	506.1	29	113.3
10	970.8	42.6	700	1.8	456.5	29	115.1
11	457.1	50.1	700	1.0	241.1	29	116.5
12	358.3	56.6	700	1.0	246.9	29	117.5
13	93.8	61.6	700	.4	84.3	29	118.2
14	89.2	66.8	700	.8	89.2	29	118.8

ITERATION	INITIAL	CALCULATED
1	1.0000	4.1830
2	4.1830	4.8519
3	4.8519	4.8964
4	4.8964	4.8990

FACTOR OF SAFETY= 4.90 AT X= 105 Y= 101 R= 15
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	106.0	102.0	15.0	5.22

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	153.5	-14.2	700	1.8	72.2	29	102.3
2	422.0	-7.1	700	1.8	198.5	29	104.2
3	641.7	-1.1	700	1.8	301.8	29	106.0
4	813.8	6.9	700	1.8	382.7	29	107.8
5	937.2	14.0	700	1.8	440.8	29	109.6
6	1008.4	21.3	700	1.8	474.2	29	111.4
7	1020.4	29.1	700	1.8	479.9	29	113.3
8	960.7	37.4	700	1.8	451.8	29	115.1
9	466.7	44.5	700	1.0	245.6	29	116.5
10	398.2	50.1	700	1.0	265.7	29	117.5
11	215.7	55.6	700	.7	184.1	29	118.4
12	124.6	62.3	700	1.0	124.6	29	119.2

ITERATION	INITIAL	CALCULATED
1	1.0000	4.4326
2	4.4326	5.1679
3	5.1679	5.2127
4	5.2127	5.2151

FACTOR OF SAFETY= 5.22 AT X= 106 Y= 102 R= 15
EARTHQUAKE= .10

Interior Slope

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	109.0	100.0	20.0	3.78

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	591.0	-43.3	700	3.1	277.9	29	95.4
2	1457.2	-32.0	700	3.1	685.3	29	98.5
3	2405.2	-21.8	700	3.2	1131.2	29	101.6
4	3375.3	-12.2	700	3.2	1587.4	29	104.8
5	4137.1	-2.9	700	3.2	1945.6	29	108.0
6	4703.9	6.3	700	3.2	2212.2	29	111.2
7	5072.0	15.7	700	3.2	2385.7	29	114.4
8	3258.4	23.6	700	2.0	1636.9	29	117.0
9	4602.0	31.8	700	3.0	2572.6	29	119.5
10	3801.3	42.7	700	3.0	2385.6	29	122.5
11	2580.8	56.4	700	3.0	2001.1	29	125.5
12	1.2	64.2	700	.0	1.2	29	127.0
13	453.1	70.3	700	1.4	453.1	29	127.7

ITERATION	INITIAL	CALCULATED
1	1.0000	3.7806
2	3.7806	3.7785

FACTOR OF SAFETY= 3.78 AT X= 109 Y= 100 R= 20
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	106.0	106.0	20.0	4.41

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	1.1	-17.8	700	.2	.5	29	99.9
2	261.9	-14.1	700	2.3	123.2	29	101.1
3	686.1	-7.4	700	2.3	322.7	29	103.4
4	1038.0	- .8	700	2.3	488.2	29	105.7
5	1319.3	5.7	700	2.3	620.4	29	108.0
6	1528.9	12.4	700	2.3	719.0	29	110.3
7	1662.7	19.2	700	2.3	782.0	29	112.6
8	1712.6	26.3	700	2.3	805.4	29	114.9
9	1461.5	33.4	700	2.0	791.8	29	117.0
10	1055.6	40.0	700	1.7	701.8	29	118.8
11	742.9	46.7	700	1.7	614.1	29	120.5
12	353.9	55.1	700	2.0	353.9	29	122.3

ITERATION	INITIAL	CALCULATED
1	1.0000	3.8643
2	3.8643	4.3791
3	4.3791	4.4085
4	4.4085	4.4100

FACTOR OF SAFETY= 4.41 AT X= 106 Y= 106 R= 20
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	102.0	104.0	20.0	4.95

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	269.2	-27.2	700	2.8	126.6	29	92.9
2	667.8	-18.3	700	2.8	314.1	29	95.7
3	906.6	-9.9	700	2.8	426.4	29	98.6
4	1148.3	-1.9	700	2.7	540.0	29	101.3
5	1539.2	5.8	700	2.7	723.9	29	104.0
6	1816.1	13.5	700	2.7	854.1	29	106.7
7	1970.8	21.6	700	2.7	926.8	29	109.3
8	1985.5	30.1	700	2.7	933.7	29	112.0
9	1825.4	39.5	700	2.7	858.5	29	114.7
10	1114.1	48.8	700	2.0	628.5	29	117.0
11	462.2	56.4	700	1.3	366.0	29	118.6
12	141.8	63.0	700	1.1	141.8	29	119.8

ITERATION	INITIAL	CALCULATED
1	1.0000	4.5173
2	4.5173	4.9325
3	4.9325	4.9501
4	4.9501	4.9508

FACTOR OF SAFETY= 4.95 AT X= 102 Y= 104 R= 20
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	87.00
2	100.00	87.00
3	116.00	95.00
4	118.00	96.00
5	127.00	96.00
6	156.00	81.50
7	200.00	81.50

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	3	2
3	3	6	2
4	6	7	2
5	3	4	1
6	4	5	1
7	5	6	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	102.0	107.0	20.0	6.40

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	103.9	-2.7	700	1.8	48.8	29	101.0
2	287.4	2.3	700	1.8	135.2	29	102.8
3	438.8	7.4	700	1.8	206.4	29	104.6
4	557.3	12.5	700	1.8	262.1	29	106.3
5	641.2	17.7	700	1.8	301.5	29	108.1
6	687.9	23.1	700	1.8	323.5	29	109.8
7	693.2	28.7	700	1.8	326.0	29	111.6
8	650.7	34.7	700	1.8	306.0	29	113.4
9	550.2	41.1	700	1.8	258.7	29	115.1
10	346.6	47.8	700	1.6	228.6	29	116.8
11	57.2	52.2	700	.4	57.2	29	117.8
12	42.8	54.9	700	.7	42.8	29	118.4

ITERATION	INITIAL	CALCULATED
1	1.0000	5.2973
2	5.2973	6.3473
3	6.3473	6.4019
4	6.4019	6.4043

FACTOR OF SAFETY= 6.40 AT X= 102 Y= 107 R= 20
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

Exterior Slope

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	Ø	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	53.0	86.0	10.0	4.67

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	Ø	X
1	.0	-63.4	700	.0	.0	29	44.1
2	403.4	-54.5	700	1.8	207.0	29	45.0
3	984.1	-39.0	700	1.8	512.6	29	46.7
4	1413.9	-26.7	700	1.8	747.1	29	48.5
5	1747.3	-15.6	700	1.8	936.3	29	50.3
6	2004.4	-5.1	700	1.8	1089.7	29	52.1
7	2192.7	5.2	700	1.8	1210.7	29	53.9
8	2312.3	15.6	700	1.8	1299.3	29	55.7
9	2355.5	26.7	700	1.8	1352.1	29	57.5
10	2302.3	39.1	700	1.8	1359.5	29	59.3
11	2097.9	54.6	700	1.8	1295.8	29	61.1
12	846.5	71.4	700	.9	562.6	29	62.4

ITERATION	INITIAL	CALCULATED
1	1.0000	5.9845
2	5.9845	4.6933
3	4.6933	4.6741
4	4.6741	4.6738

FACTOR OF SAFETY= 4.67 AT X= 53 Y= 86 R= 10
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	50.0	92.0	10.0	7.29

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	15.8	-19.6	700	.6	15.8	29	46.6
2	143.2	-14.2	700	1.3	112.5	29	47.5
3	270.5	-6.9	700	1.3	188.3	29	48.8
4	373.8	.3	700	1.3	252.9	29	50.1
5	453.8	7.6	700	1.3	306.5	29	51.3
6	509.8	14.9	700	1.3	348.8	29	52.6
7	539.8	22.5	700	1.3	378.9	29	53.8
8	540.1	30.6	700	1.3	395.0	29	55.1
9	503.4	39.4	700	1.3	393.7	29	56.3
10	415.0	49.7	700	1.3	368.1	29	57.6
11	162.0	59.2	700	.7	162.0	29	58.6
12	72.6	68.8	700	.7	72.6	29	59.3

ITERATION	INITIAL	CALCULATED
1	1.0000	6.0224
2	6.0224	7.2216
3	7.2216	7.2876
4	7.2876	7.2907

FACTOR OF SAFETY= 7.29 AT X= 50 Y= 92 R= 10
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	Ø	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	52.0	94.0	10.0	9.24

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	Ø	X
1	36.9	-11.2	700	.9	36.9	29	50.1
2	103.3	-5.8	700	.9	103.3	29	51.0
3	174.9	-.3	700	1.0	163.3	29	52.0
4	228.9	5.5	700	1.0	198.9	29	53.0
5	270.8	11.3	700	1.0	228.9	29	54.0
6	299.9	17.3	700	1.0	252.8	29	55.0
7	315.3	23.5	700	1.0	270.3	29	56.0
8	315.1	29.9	700	1.0	280.5	29	57.0
9	296.4	36.8	700	1.0	281.9	29	58.0
10	232.0	44.1	700	.9	232.0	29	58.9
11	173.4	51.9	700	.9	173.4	29	59.8
12	75.7	61.6	700	.9	75.7	29	60.8

ITERATION	INITIAL	CALCULATED
1	1.0000	7.5257
2	7.5257	9.1670
3	9.1670	9.2357
4	9.2357	9.2381

FACTOR OF SAFETY= 9.24 AT X= 52 Y= 94 R= 10
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	46.0	92.0	10.0	13.12

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	6.4	-4.0	700	.4	6.4	29	45.3
2	48.3	-3	700	.9	39.8	29	45.9
3	89.1	4.7	700	.9	66.6	29	46.8
4	122.1	9.7	700	.9	89.7	29	47.7
5	147.1	14.8	700	.9	109.0	29	48.5
6	163.6	20.0	700	.9	124.4	29	49.4
7	171.0	25.3	700	.9	135.5	29	50.3
8	168.0	31.0	700	.9	141.6	29	51.1
9	152.7	37.0	700	.9	142.1	29	52.0
10	101.1	42.8	700	.7	101.1	29	52.8
11	71.7	48.5	700	.7	71.7	29	53.5
12	28.7	54.9	700	.7	28.7	29	54.2

ITERATION	INITIAL	CALCULATED
1	1.0000	10.5338
2	10.5338	13.0454
3	13.0454	13.1176
4	13.1176	13.1192

FACTOR OF SAFETY= 13.12 AT X= 46 Y= 92 R= 10
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

Exterior Slope

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	Ø	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	57.0	90.0	15.0	3.50

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	Ø	X
1	.2	-56.4	700	.0	.2	29	44.5
2	771.2	-48.6	700	2.7	412.6	29	45.9
3	1918.5	-34.7	700	2.7	1023.9	29	48.5
4	2790.9	-23.0	700	2.7	1505.9	29	51.2
5	3470.9	-12.2	700	2.7	1897.5	29	53.8
6	3991.0	-2.0	700	2.7	2213.8	29	56.5
7	4361.8	8.3	700	2.7	2460.0	29	59.2
8	4578.8	18.8	700	2.7	2633.8	29	61.8
9	4619.4	30.0	700	2.7	2724.6	29	64.5
10	4426.6	42.9	700	2.7	2705.7	29	67.1
11	3832.4	60.1	700	2.7	2498.0	29	69.8
12	894.7	78.3	700	.8	658.1	29	71.5

ITERATION	INITIAL	CALCULATED
1	1.0000	3.6880
2	3.6880	3.5051
3	3.5051	3.4972
4	3.4972	3.4969

FACTOR OF SAFETY= 3.50 AT X= 57 Y= 90 R= 15
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	Ø	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	58.0	98.0	15.0	4.45

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	Ø	X
1	105.4	-26.1	700	1.3	105.4	29	51.4
2	558.7	-19.0	700	2.1	458.1	29	53.1
3	959.9	-10.7	700	2.1	691.9	29	55.2
4	1282.8	-2.5	700	2.1	889.0	29	57.3
5	1531.3	5.6	700	2.1	1051.0	29	59.5
6	1704.3	13.8	700	2.1	1177.6	29	61.6
7	1796.2	22.3	700	2.1	1266.0	29	63.7
8	1793.9	31.4	700	2.1	1310.1	29	65.8
9	1670.8	41.5	700	2.1	1297.4	29	67.9
10	1365.3	53.8	700	2.1	1198.9	29	70.0
11	624.6	71.3	700	1.8	624.6	29	72.0

ITERATION	INITIAL	CALCULATED
1	1.0000	3.8124
2	3.8124	4.4023
3	4.4023	4.4514
4	4.4514	4.4550

FACTOR OF SAFETY= 4.45 AT X= 58 Y= 98 R= 15
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	52.0	96.0	15.0	4.70

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	7.3	-23.9	700	.4	7.3	29	45.9
2	264.1	-19.3	700	1.9	182.7	29	47.0
3	593.0	-11.8	700	1.9	373.9	29	48.9
4	864.7	-4.5	700	1.9	538.1	29	50.8
5	1082.3	2.8	700	1.9	676.8	29	52.7
6	1246.8	10.1	700	1.9	790.2	29	54.6
7	1353.5	17.6	700	1.9	877.2	29	56.5
8	1398.9	25.4	700	1.9	934.9	29	58.4
9	1371.1	33.8	700	1.9	958.3	29	60.3
10	1248.9	43.1	700	1.9	937.2	29	62.2
11	985.1	54.3	700	1.9	849.5	29	64.1
12	412.6	69.1	700	1.6	412.6	29	65.9

ITERATION	INITIAL	CALCULATED
1	1.0000	3.9771
2	3.9771	4.6404
3	4.6404	4.6925
4	4.6925	4.6961

FACTOR OF SAFETY= 4.70 AT X= 52 Y= 96 R= 15
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	220.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	Ø	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	47.0	97.0	15.0	8.30

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	Ø	X
1	7.2	-6.0	700	.4	7.2	29	45.4
2	113.9	-2.4	700	1.4	88.1	29	46.4
3	233.3	3.1	700	1.4	165.0	29	47.8
4	329.4	8.6	700	1.4	231.0	29	49.2
5	401.6	14.2	700	1.4	285.8	29	50.7
6	448.4	19.9	700	1.4	328.6	29	52.1
7	467.3	25.9	700	1.4	358.3	29	53.5
8	454.3	32.2	700	1.4	373.0	29	55.0
9	403.0	38.9	700	1.4	369.7	29	56.4
10	302.2	46.4	700	1.4	302.2	29	57.8
11	128.9	55.2	700	1.4	128.9	29	59.3

ITERATION	INITIAL	CALCULATED
1	1.0000	6.7507
2	6.7507	8.2322
3	8.2322	8.2974
4	8.2974	8.2998

FACTOR OF SAFETY= 8.30 AT X= 47 Y= 97 R= 15
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

Exterior Slope

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	58.0	95.0	20.0	3.00

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	35.8	-46.0	700	.8	16.8	29	43.6
2	1141.1	-38.5	700	3.2	589.3	29	45.6
3	2540.2	-27.4	700	3.2	1352.6	29	48.8
4	3653.0	-17.4	700	3.2	1981.2	29	52.1
5	4537.0	-7.8	700	3.2	2502.2	29	55.3
6	5216.8	1.4	700	3.2	2927.2	29	58.5
7	5698.1	10.8	700	3.2	3258.8	29	61.7
8	5970.0	20.4	700	3.2	3491.9	29	64.9
9	5999.8	30.7	700	3.2	3611.2	29	68.2
10	5713.3	42.3	700	3.2	3581.8	29	71.4
11	3659.4	54.7	700	2.4	2377.4	29	74.2
12	2355.2	72.4	700	2.4	1638.0	29	76.7
13	25.1	85.6	700	.1	25.1	29	77.9

ITERATION	INITIAL	CALCULATED
1	1.0000	2.8932
2	2.8932	2.9918
3	2.9918	2.9982
4	2.9982	2.9986

FACTOR OF SAFETY= 3.00 AT X= 58 Y= 95 R= 20
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	95.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	50.0	100.0	20.0	4.21

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	58.1	-19.9	700	1.6	27.3	29	43.2
2	468.3	-13.7	700	2.5	252.9	29	45.3
3	981.2	-6.3	700	2.5	559.4	29	47.8
4	1395.7	1.0	700	2.5	819.6	29	50.3
5	1713.5	8.3	700	2.5	1034.4	29	52.9
6	1931.5	15.8	700	2.5	1202.2	29	55.4
7	2040.9	23.5	700	2.5	1319.0	29	58.0
8	2024.6	31.7	700	2.5	1376.5	29	60.5
9	1849.6	40.8	700	2.5	1359.5	29	63.0
10	1446.3	51.5	700	2.5	1235.2	29	65.6
11	603.2	65.0	700	2.3	603.2	29	68.0

ITERATION	INITIAL	CALCULATED
1	1.0000	3.6025
2	3.6025	4.1625
3	4.1625	4.2063
4	4.2063	4.2093

FACTOR OF SAFETY= 4.21 AT X= 50 Y= 100 R= 20
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	52.0	102.0	20.0	4.61

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	21.2	-14.9	700	.7	21.2	29	46.9
2	355.1	-10.6	700	2.3	266.6	29	48.3
3	733.9	-4.0	700	2.3	496.7	29	50.6
4	1043.7	2.5	700	2.3	694.3	29	52.9
5	1284.8	9.0	700	2.3	859.6	29	55.1
6	1454.7	15.7	700	2.3	991.5	29	57.4
7	1547.7	22.6	700	2.3	1087.2	29	59.7
8	1553.5	29.8	700	2.3	1141.9	29	61.9
9	1453.8	37.6	700	2.3	1146.9	29	64.2
10	1214.3	46.5	700	2.3	1086.2	29	66.4
11	581.7	55.0	700	1.5	581.7	29	68.4
12	250.1	64.0	700	1.5	250.1	29	69.9

ITERATION	INITIAL	CALCULATED
1	1.0000	3.8773
2	3.8773	4.5600
3	4.5600	4.6115
4	4.6115	4.6148

FACTOR OF SAFETY= 4.61 AT X= 52 Y= 102 R= 20
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	46.0	102.0	20.0	7.88

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	6.6	-2.1	700	.5	6.6	29	45.3
2	125.4	.9	700	1.6	97.1	29	46.3
3	263.6	5.6	700	1.6	189.0	29	47.9
4	376.1	10.3	700	1.6	268.7	29	49.6
5	461.9	15.1	700	1.6	335.9	29	51.2
6	519.5	20.0	700	1.6	389.8	29	52.8
7	546.5	25.0	700	1.6	429.3	29	54.4
8	539.3	30.3	700	1.6	452.8	29	56.1
9	492.6	35.9	700	1.6	457.6	29	57.7
10	338.0	41.3	700	1.3	338.0	29	59.2
11	239.0	46.7	700	1.3	239.0	29	60.5
12	94.8	52.7	700	1.3	94.8	29	61.9

ITERATION	INITIAL	CALCULATED
1	1.0000	6.4094
2	6.4094	7.8126
3	7.8126	7.8758
4	7.8758	7.8782

FACTOR OF SAFETY= 7.88 AT X= 46 Y= 102 R= 20
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

Exterior Slope

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	57.0	99.0	25.0	2.82

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	330.9	-41.8	700	2.4	155.6	29	40.4
2	876.6	-34.7	700	2.4	412.3	29	42.8
3	2938.2	-26.0	700	4.1	1468.8	29	46.1
4	4718.6	-15.8	700	4.1	2480.1	29	50.2
5	6119.1	-6.1	700	4.1	3312.9	29	54.4
6	7176.4	3.5	700	4.1	3984.1	29	58.5
7	7894.5	13.1	700	4.1	4495.8	29	62.6
8	8246.7	23.1	700	4.1	4835.5	29	66.8
9	8162.1	34.1	700	4.1	4969.8	29	70.9
10	7138.5	47.0	700	4.3	4419.6	29	75.1
11	4073.3	66.5	700	4.3	2595.1	29	79.4
12	35.2	81.0	700	.3	35.2	29	81.7

ITERATION	INITIAL	CALCULATED
1	1.0000	2.7148
2	2.7148	2.8136
3	2.8136	2.8196
4	2.8196	2.8200

FACTOR OF SAFETY= 2.82 AT X= 57 Y= 99 R= 25
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	50.0	100.0	25.0	3.27

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	633.0	-37.1	700	3.6	297.7	29	35.0
2	1590.7	-27.2	700	3.6	748.1	29	38.6
3	2230.1	-18.2	700	3.6	1048.0	29	42.2
4	3526.1	-9.1	700	4.1	1745.3	29	46.1
5	4688.1	.5	700	4.1	2465.8	29	50.2
6	5512.7	10.1	700	4.1	3027.7	29	54.4
7	5983.5	20.0	700	4.1	3423.1	29	58.5
8	6046.2	30.5	700	4.1	3626.6	29	62.6
9	5573.1	42.5	700	4.1	3578.2	29	66.8
10	4216.0	57.9	700	4.1	3114.0	29	70.9
11	302.4	68.5	700	.5	284.9	29	73.2
12	376.3	75.4	700	1.2	376.3	29	74.1

ITERATION	INITIAL	CALCULATED
1	1.0000	3.0608
2	3.0608	3.2527
3	3.2527	3.2655
4	3.2655	3.2663

FACTOR OF SAFETY= 3.27 AT X= 50 Y= 100 R= 25
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	Ø	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	48.0	106.0	25.0	4.72

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	Ø	X
1	10.8	-10.3	700	1.0	5.1	29	43.5
2	283.9	-6.3	700	2.5	164.9	29	45.2
3	692.3	-6	700	2.5	419.6	29	47.7
4	1028.1	5.1	700	2.5	640.2	29	50.2
5	1290.4	10.9	700	2.5	826.3	29	52.7
6	1475.9	16.7	700	2.5	976.3	29	55.2
7	1578.7	22.8	700	2.5	1087.3	29	57.7
8	1588.6	29.2	700	2.5	1154.6	29	60.2
9	1488.9	36.0	700	2.5	1170.4	29	62.6
10	1251.1	43.4	700	2.5	1121.3	29	65.1
11	687.7	50.9	700	1.9	687.7	29	67.4
12	284.9	58.7	700	1.9	284.9	29	69.3

ITERATION	INITIAL	CALCULATED
1	1.0000	3.9636
2	3.9636	4.6680
3	4.6680	4.7174
4	4.7174	4.7203

FACTOR OF SAFETY= 4.72 AT X= 48 Y= 106 R= 25
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	42.0	106.0	25.0	11.03

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	56.9	-8.8	700	2.3	26.7	29	38.2
2	124.8	-3.4	700	2.3	58.7	29	40.5
3	133.1	1.9	700	2.3	62.6	29	42.8
4	210.3	7.0	700	2.1	121.7	29	45.1
5	386.5	12.0	700	2.1	250.1	29	47.2
6	514.6	17.0	700	2.1	355.9	29	49.3
7	591.2	22.2	700	2.1	437.5	29	51.4
8	611.2	27.5	700	2.1	492.5	29	53.5
9	566.4	33.2	700	2.1	517.0	29	55.7
10	477.6	39.5	700	2.3	477.6	29	57.9
11	202.3	46.9	700	2.3	202.3	29	60.2

ITERATION	INITIAL	CALCULATED
1	1.0000	9.4221
2	9.4221	10.9930
3	10.9930	11.0292
4	11.0292	11.0299

FACTOR OF SAFETY= 11.03 AT X= 42 Y= 106 R= 25
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

Exterior Slope

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	Ø	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	55.0	102.0	30.0	2.77

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	Ø	X
1	763.6	-42.2	700	3.6	359.1	29	34.9
2	1963.7	-33.4	700	3.6	923.5	29	38.5
3	2836.0	-25.4	700	3.6	1333.7	29	42.2
4	5382.9	-16.7	700	4.8	2650.0	29	46.4
5	7339.0	-7.2	700	4.8	3806.8	29	51.3
6	8837.8	2.1	700	4.8	4740.5	29	56.1
7	9889.4	11.4	700	4.8	5480.0	29	60.9
8	10466.6	21.1	700	4.8	5988.3	29	65.8
9	10491.6	31.5	700	4.8	6236.9	29	70.6
10	8552.9	42.7	700	4.5	5132.4	29	75.3
11	5806.7	56.4	700	4.5	3414.4	29	79.8
12	1006.1	69.7	700	2.0	577.7	29	83.0
13	6.3	75.8	700	.2	3.0	29	84.1

ITERATION	INITIAL	CALCULATED
1	1.0000	2.7349
2	2.7349	2.7707
3	2.7707	2.7723

FACTOR OF SAFETY= 2.77 AT X= 55 Y= 102 R= 30
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	50.0	100.0	30.0	3.00

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	1382.1	-45.9	700	4.4	612.4	29	28.6
2	3222.5	-34.7	700	4.4	1515.5	29	33.0
3	4525.5	-24.9	700	4.4	2128.3	29	37.4
4	5373.3	-15.9	700	4.4	2527.0	29	41.8
5	7113.4	-6.9	700	4.8	3463.8	29	46.4
6	8596.8	2.4	700	4.8	4398.3	29	51.3
7	9632.8	11.7	700	4.8	5122.4	29	56.1
8	10192.6	21.4	700	4.8	5622.5	29	60.9
9	10196.3	31.8	700	4.8	5861.2	29	65.8
10	9460.9	43.7	700	4.8	5752.2	29	70.6
11	4878.3	55.3	700	3.1	3112.1	29	74.6
12	2775.9	68.9	700	3.1	1916.7	29	77.7
13	80.3	79.8	700	.5	80.3	29	79.5

ITERATION	INITIAL	CALCULATED
1	1.0000	3.0347
2	3.0347	2.9976
3	2.9976	2.9960

FACTOR OF SAFETY= 3.00 AT X= 50 Y= 100 R= 30
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	45.0	105.0	30.0	3.77

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	827.9	-33.4	700	4.4	389.4	29	28.6
2	2069.8	-23.7	700	4.4	973.4	29	33.8
3	2867.2	-14.8	700	4.4	1348.4	29	37.4
4	3289.0	-6.2	700	4.4	1546.8	29	41.8
5	4095.7	2.5	700	4.6	2031.9	29	46.3
6	5028.9	11.3	700	4.6	2682.2	29	50.8
7	5562.9	20.4	700	4.6	3144.8	29	55.4
8	5638.5	30.1	700	4.6	3391.7	29	60.0
9	5126.7	40.9	700	4.6	3362.5	29	64.5
10	3713.4	54.2	700	4.6	2909.2	29	69.1
11	614.8	65.3	700	1.6	614.8	29	72.2
12	67.7	70.8	700	.6	67.7	29	73.3

ITERATION	INITIAL	CALCULATED
1	1.0000	3.5111
2	3.5111	3.7524
3	3.7524	3.7651
4	3.7651	3.7657

FACTOR OF SAFETY= 3.77 AT X= 45 Y= 105 R= 30
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	52.0	112.0	30.0	3.84

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	18.1	-10.6	700	.7	18.1	29	46.5
2	481.0	-7.1	700	2.9	352.3	29	48.3
3	1055.4	-1.6	700	2.9	708.2	29	51.2
4	1532.7	4.0	700	2.9	1018.5	29	54.1
5	1912.4	9.6	700	2.9	1282.8	29	57.0
6	2190.9	15.3	700	2.9	1499.7	29	59.9
7	2361.4	21.2	700	2.9	1665.6	29	62.8
8	2412.2	27.3	700	2.9	1775.3	29	65.7
9	2324.4	33.7	700	2.9	1819.9	29	68.6
10	2067.1	40.8	700	2.9	1784.7	29	71.5
11	594.6	45.8	700	1.0	570.9	29	73.5
12	674.7	49.7	700	1.7	674.7	29	74.9
13	247.9	55.0	700	1.7	247.9	29	76.5

ITERATION	INITIAL	CALCULATED
1	1.0000	3.3179
2	3.3179	3.8044
3	3.8044	3.8394
4	3.8394	3.8416

FACTOR OF SAFETY= 3.84 AT X= 52 Y= 112 R= 30
EARTHQUAKE= .10

WATER UNIT WEIGHT = 62.40

Exterior Slope

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	55.0	105.0	35.0	2.77

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	1457.3	-42.3	700	5.0	685.4	29	31.6
2	3654.5	-32.0	700	5.0	1718.7	29	36.5
3	5159.2	-22.7	700	5.0	2426.3	29	41.5
4	8198.8	-13.4	700	5.0	4026.3	29	46.9
5	10777.7	-3.8	700	5.0	5580.3	29	52.7
6	12690.9	5.8	700	5.0	6821.2	29	58.5
7	13932.5	15.5	700	5.0	7746.2	29	64.3
8	14433.5	25.7	700	5.0	8322.9	29	70.1
9	10361.9	35.5	700	4.5	5983.1	29	75.3
10	8347.7	45.2	700	4.5	4609.4	29	79.8
11	2709.4	53.2	700	2.0	1378.7	29	83.0
12	2466.0	63.0	700	3.9	1159.7	29	85.9

ITERATION	INITIAL	CALCULATED
1	1.0000	2.7941
2	2.7941	2.7726
3	2.7726	2.7720

FACTOR OF SAFETY = 2.77 AT X = 55 Y = 105 R = 35
EARTHQUAKE = .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	50.0	100.0	35.0	2.79

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	919.2	-36.3	700	4.4	432.3	29	37.4
2	2358.1	-27.7	700	4.4	1109.0	29	41.8
3	4404.6	-19.4	700	4.8	2189.9	29	46.4
4	6529.5	-11.1	700	4.8	3426.1	29	51.3
5	8249.6	-3.1	700	4.8	4471.9	29	56.1
6	9586.2	4.8	700	4.8	5337.4	29	60.9
7	10536.8	12.8	700	4.8	6021.3	29	65.8
8	11075.0	21.1	700	4.8	6511.3	29	70.6
9	9782.4	29.6	700	4.5	5710.6	29	75.3
10	8174.9	38.6	700	4.5	4528.1	29	79.8
11	2826.0	45.6	700	2.0	1433.6	29	83.0
12	3608.6	55.7	700	5.3	1697.1	29	86.7

ITERATION	INITIAL	CALCULATED
1	1.0000	2.7363
2	2.7363	2.7910
3	2.7910	2.7928

FACTOR OF SAFETY= 2.79 AT X= 50 Y= 100 R= 35
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	50.0	100.0	35.0	2.93

SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	2844.9	-50.4	700	5.9	1337.9	29	23.3
2	6727.7	-36.7	700	5.9	3164.0	29	29.2
3	9199.3	-25.3	700	5.9	4326.3	29	35.1
4	10706.7	-14.9	700	5.9	5035.2	29	41.0
5	12170.2	-5.1	700	5.8	5894.0	29	46.9
6	14174.3	4.4	700	5.8	7177.7	29	52.7
7	15511.0	14.1	700	5.8	8147.4	29	58.5
8	16121.3	24.2	700	5.8	8775.6	29	64.3
9	15853.2	35.3	700	5.8	8990.6	29	70.1
10	10727.7	46.4	700	4.5	6155.1	29	75.3
11	7653.3	58.9	700	4.5	4282.8	29	79.0
12	1687.3	71.2	700	2.0	898.1	29	83.0
13	120.2	78.8	700	.6	60.3	29	84.3

ITERATION	INITIAL	CALCULATED
1	1.0000	3.2239
2	3.2239	2.9346
3	2.9346	2.9289
4	2.9289	2.9287

FACTOR OF SAFETY= 2.93 AT X= 50 Y= 100 R= 35
EARTHQUAKE= .10

WATER UNIT WEIGHT= 62.40

POINT	X-ORD	Y-ORD
1	0.00	81.50
2	44.00	81.50
3	73.00	96.00
4	82.00	96.00
5	84.00	95.00
6	100.00	87.00
7	200.00	87.00

LINE	LEFT	RIGHT	SOIL
1	1	2	2
2	2	5	2
3	5	6	2
4	6	7	2
5	2	3	1
6	3	4	1
7	4	5	1

SOIL	UNIT WEIGHT	COHESION	ϕ	SATURATED
1	118	700	29	NO
2	118	700	29	YES

CIRCLE	X-ORD	Y-ORD	RADIUS	FACTOR OF SAFETY
	45.0	105.0	35.0	3.20

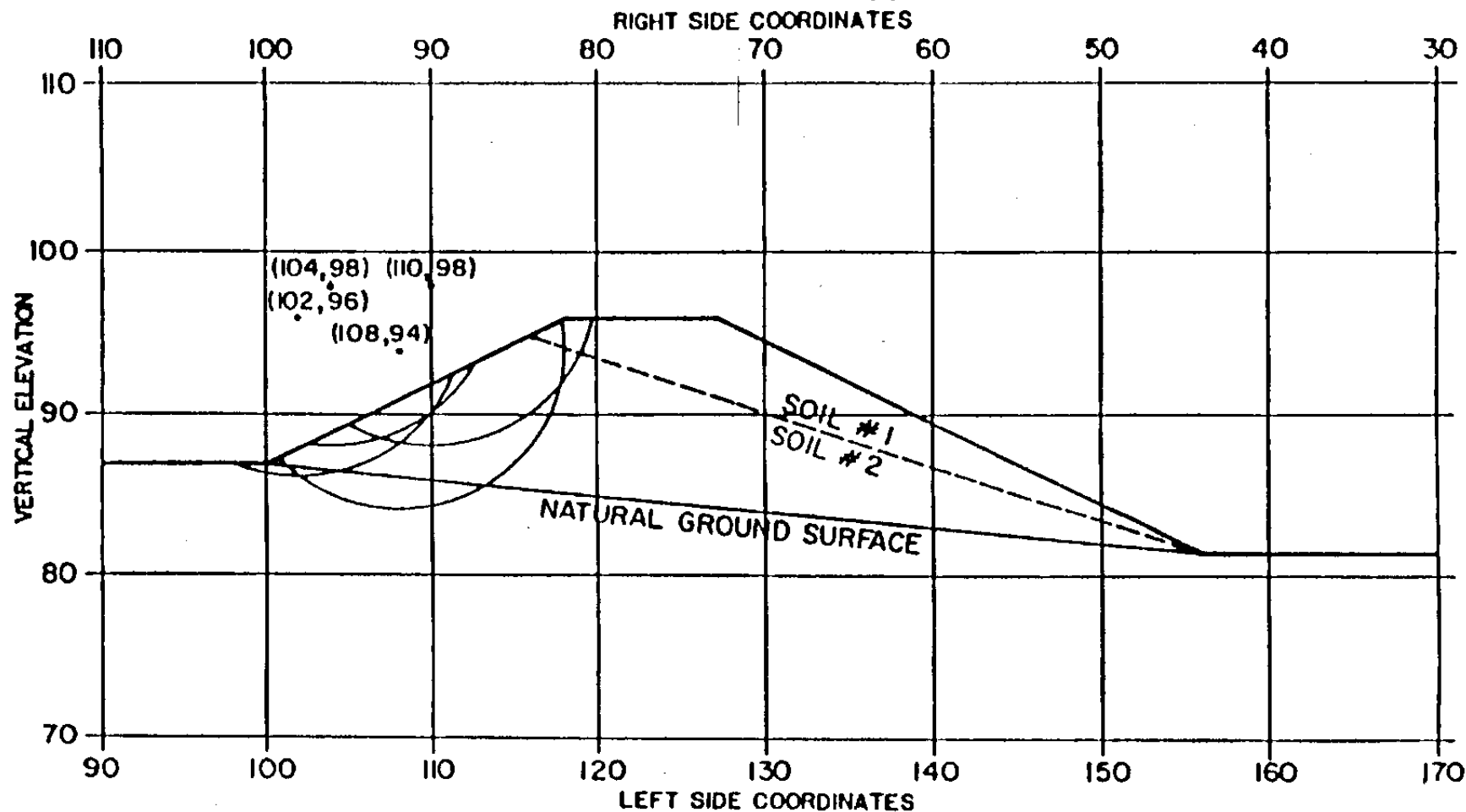
SLICE	WEIGHT	INCLINATION	COHESION	WIDTH	EFF WEIGHT	ϕ	X
1	1462.0	-42.3	700	5.0	687.5	29	21.6
2	3665.2	-32.0	700	5.0	1723.7	29	26.5
3	5173.0	-22.7	700	5.0	2432.8	29	31.5
4	6143.7	-14.1	700	5.0	2889.3	29	36.5
5	6653.8	-5.7	700	5.0	3129.2	29	41.5
6	8812.7	3.1	700	5.8	4315.1	29	46.9
7	10243.5	12.8	700	5.8	5329.1	29	52.7
8	10960.3	22.8	700	5.8	6007.3	29	58.5
9	10827.8	33.7	700	5.8	6286.1	29	64.3
10	9526.0	46.2	700	5.8	6015.0	29	70.1
11	4743.0	61.5	700	4.9	3409.3	29	75.4
12	190.1	72.5	700	1.0	190.1	29	78.3

ITERATION	INITIAL	CALCULATED
1	1.0000	3.1718
2	3.1718	3.1953
3	3.1953	3.1962

FACTOR OF SAFETY= 3.20 AT X= 45 Y= 105 R= 35
EARTHQUAKE= .10

BEAR CREEK CANYON MINE - SEDIMENTATION POND "A"

CROSS SECTION THROUGH EMBANKMENT



RADIUS = 10'

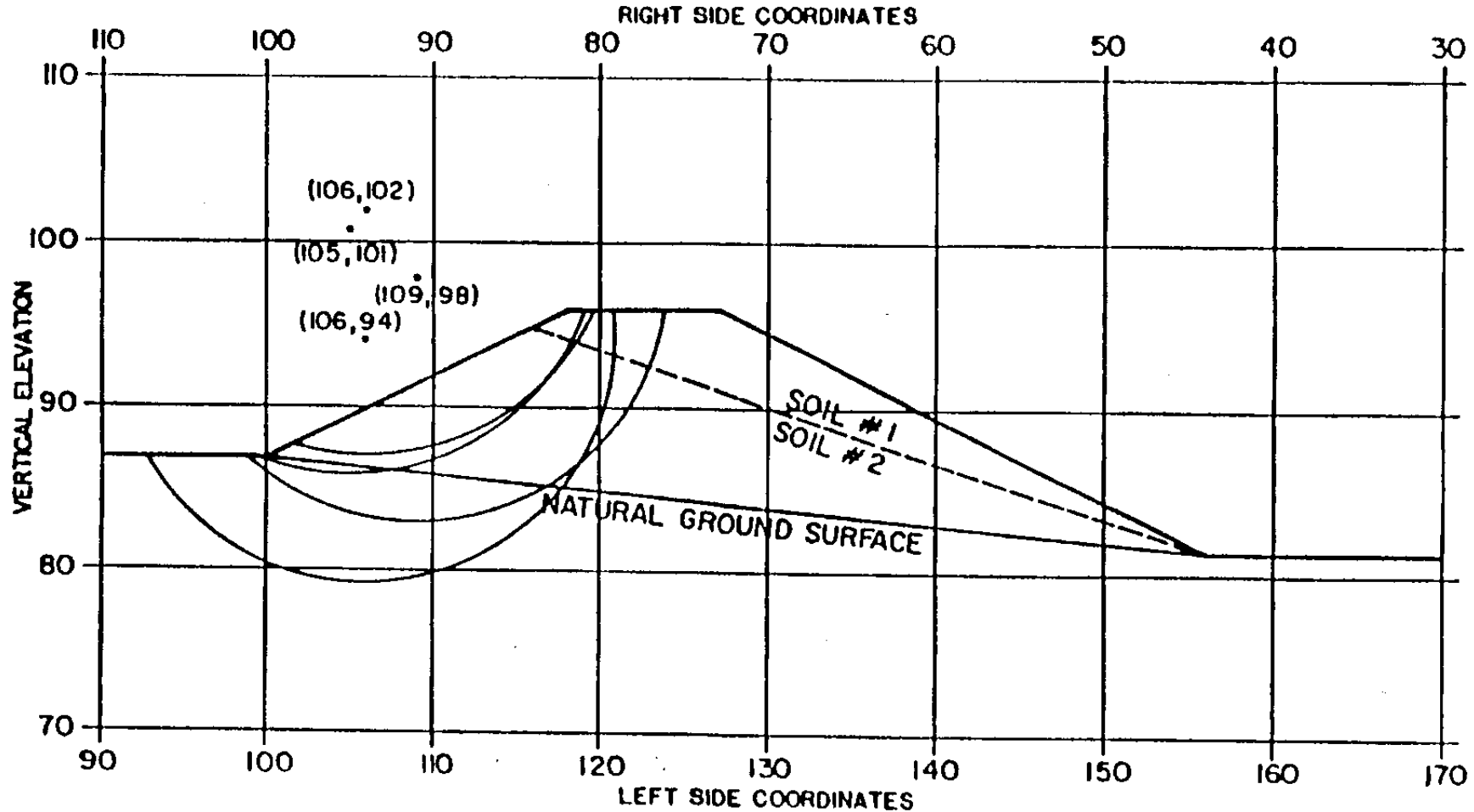
CO-OP MINING COMPANY

SCALE 1" = 10'



BEAR CREEK CANYON MINE - SEDIMENTATION POND "A"

CROSS SECTION THROUGH EMBANKMENT



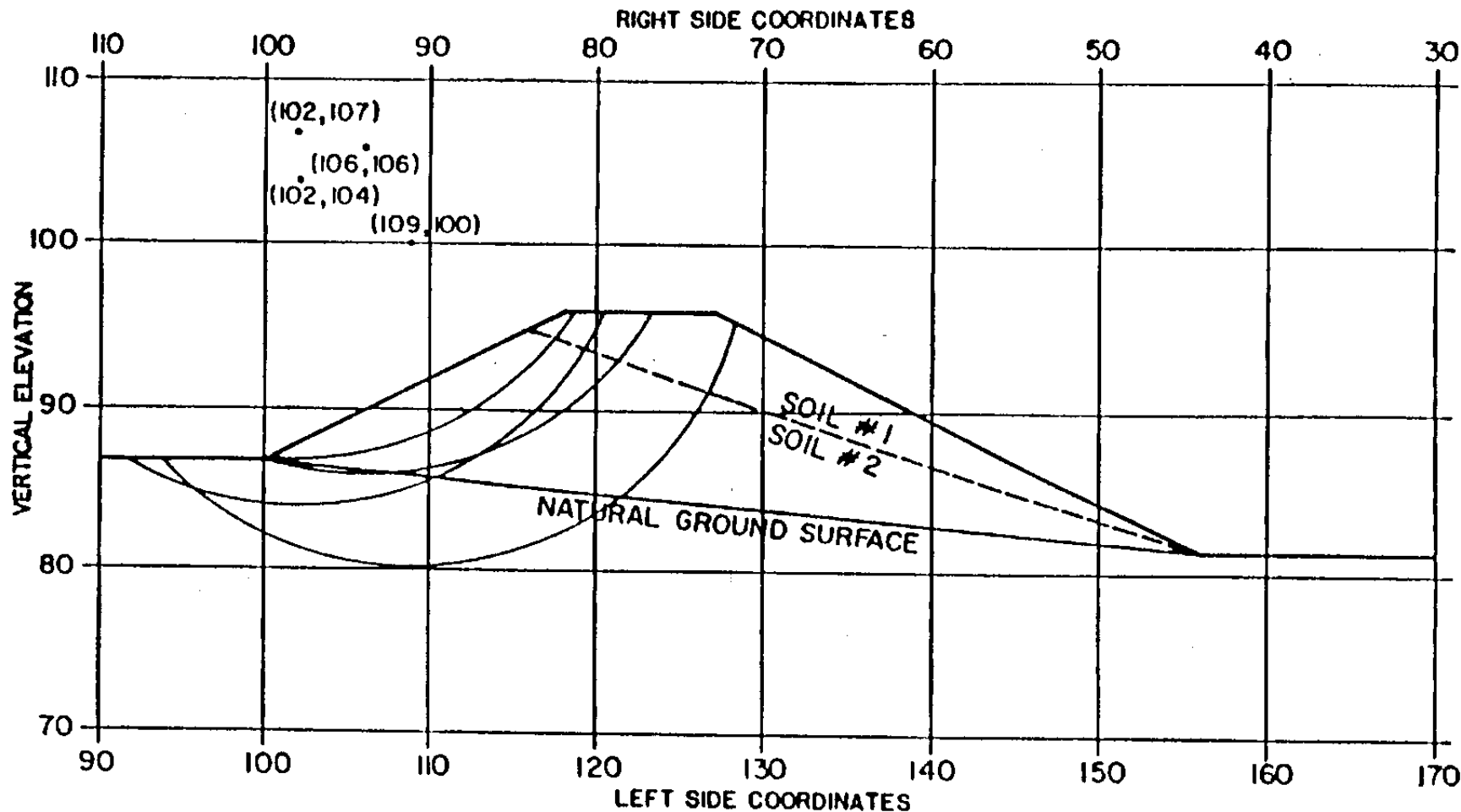
RADIUS = 15'

CO-OP MINING COMPANY

SCALE 1" = 10'

BEAR CREEK CANYON MINE - SEDIMENTATION POND "A"

CROSS SECTION THROUGH EMBANKMENT



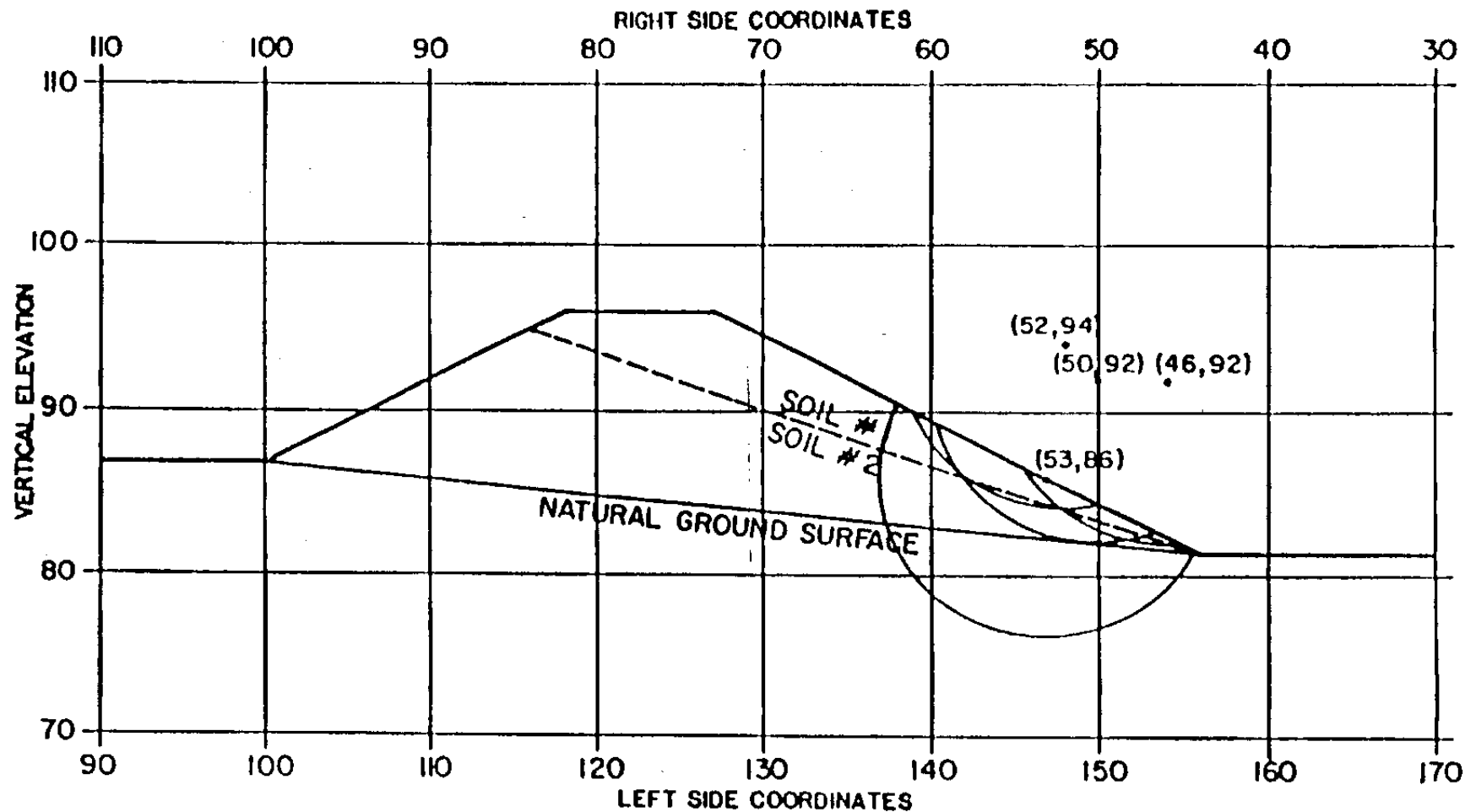
RADIUS = 20'

CO-OP MINING COMPANY

SCALE 1" = 10'

BEAR CREEK CANYON MINE - SEDIMENTATION POND "A"

CROSS SECTION THROUGH EMBANKMENT



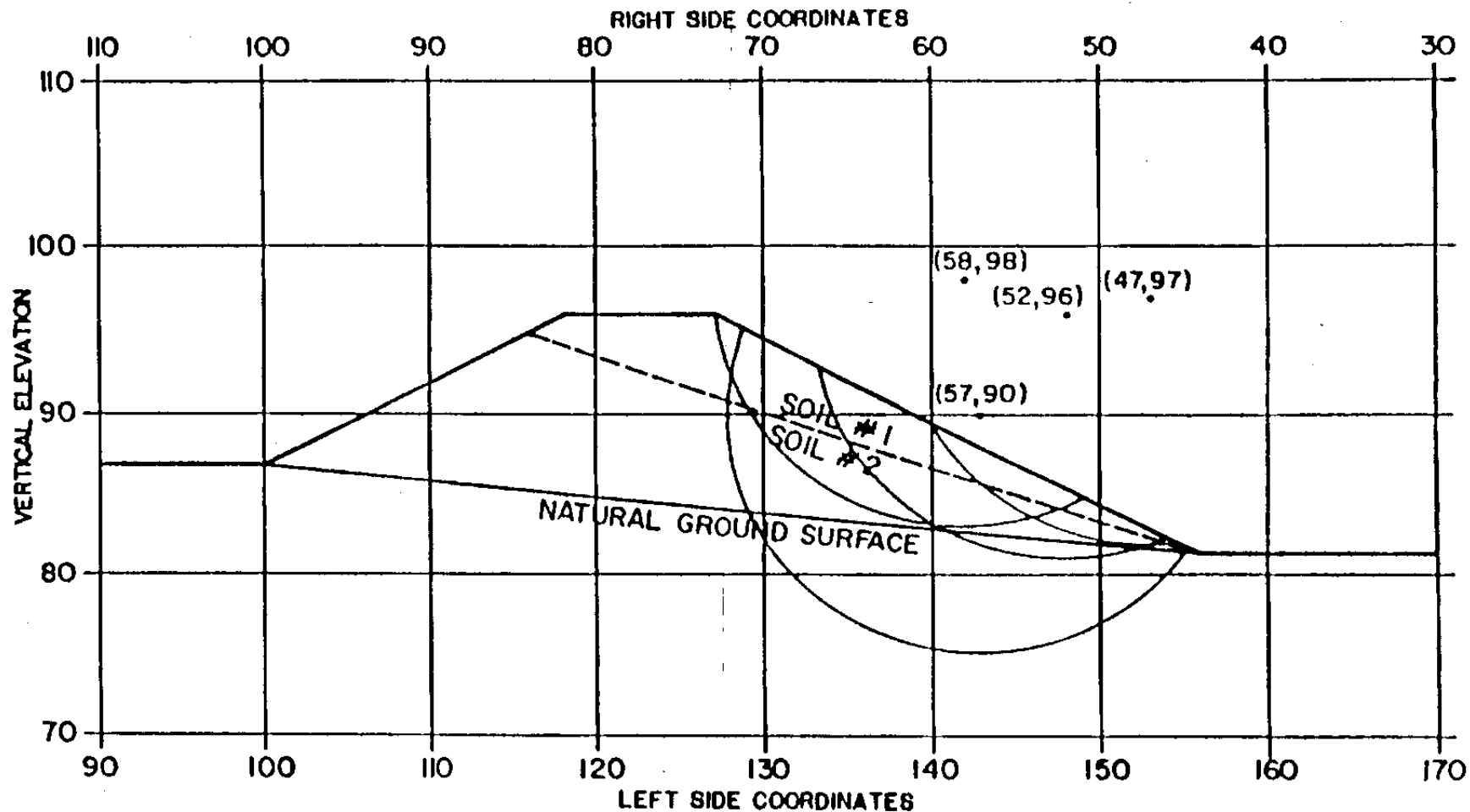
RADIUS = 10'

CO-OP MINING COMPANY

SCALE 1" = 10'

BEAR CREEK CANYON MINE - SEDIMENTATION POND "A"

CROSS SECTION THROUGH EMBANKMENT



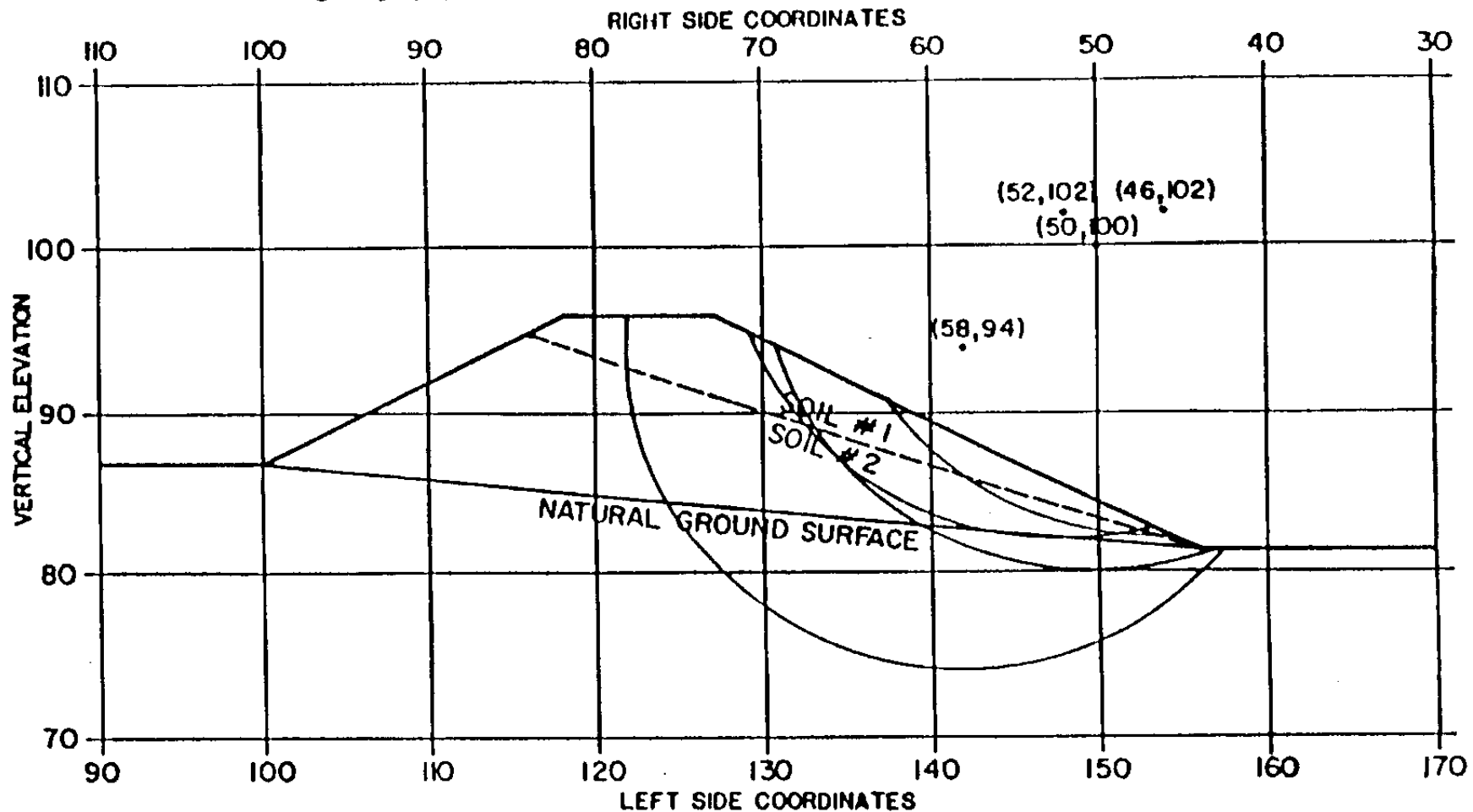
RADIUS = 15'

CO-OP MINING COMPANY

SCALE 1" = 10'

BEAR CREEK CANYON MINE - SEDIMENTATION POND "A"

CROSS SECTION THROUGH EMBANKMENT



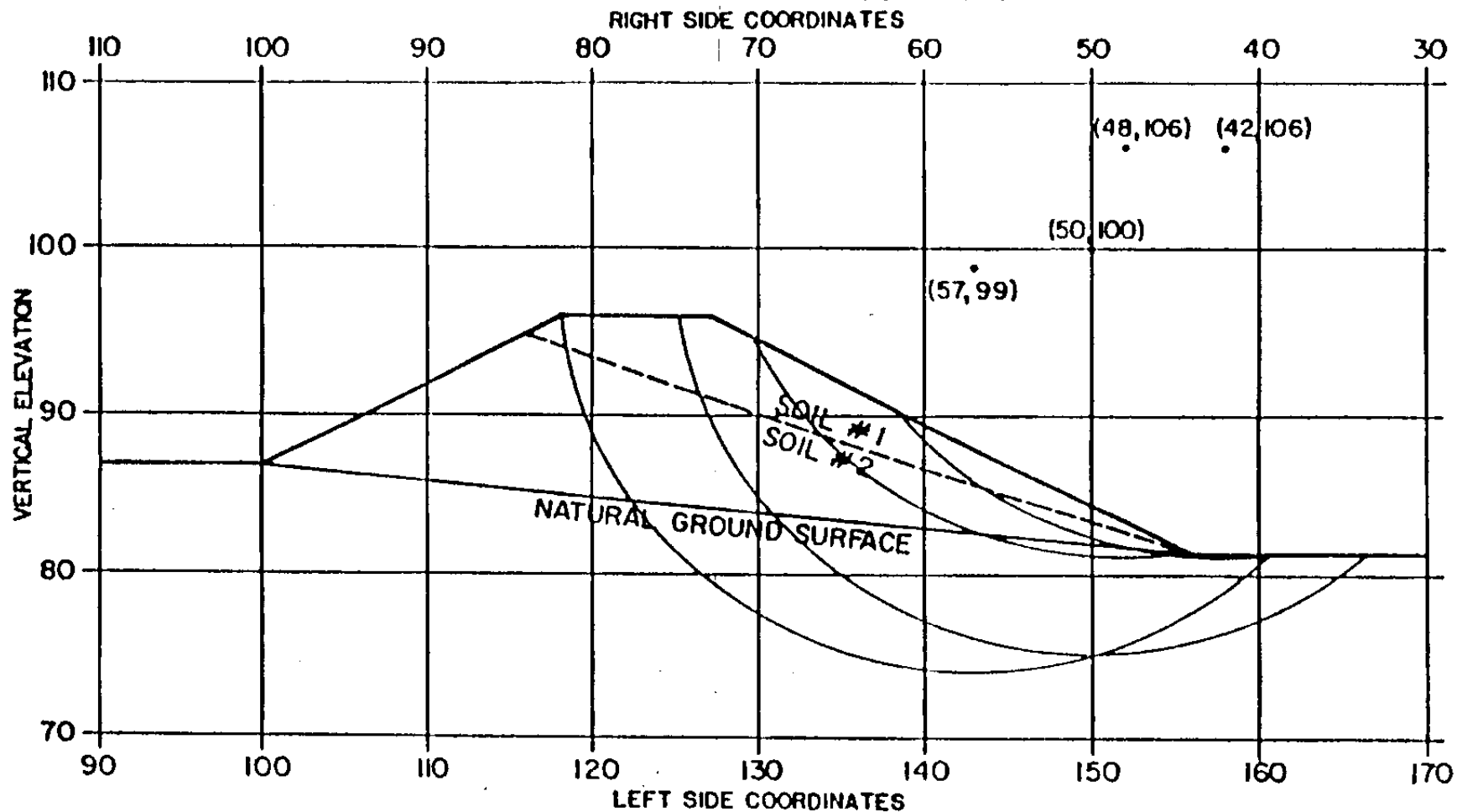
RADIUS = 20'

CO-OP MINING COMPANY

SCALE 1" = 10'

BEAR CREEK CANYON MINE - SEDIMENTATION POND "A"

CROSS SECTION THROUGH EMBANKMENT



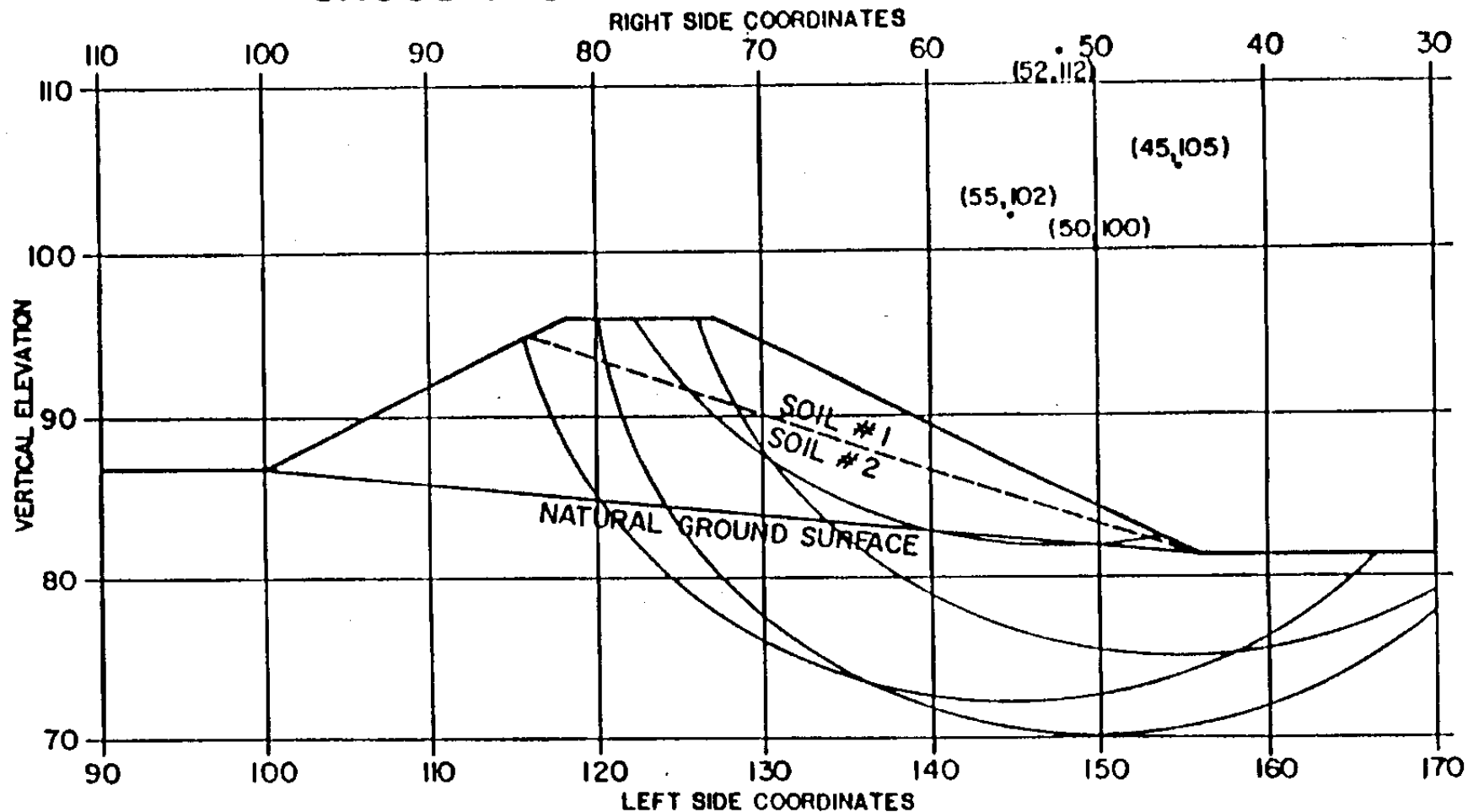
RADIUS = 25'

CO-OP MINING COMPANY

SCALE 1" = 10'

BEAR CREEK CANYON MINE - SEDIMENTATION POND "A"

CROSS SECTION THROUGH EMBANKMENT



RADIUS = 30'

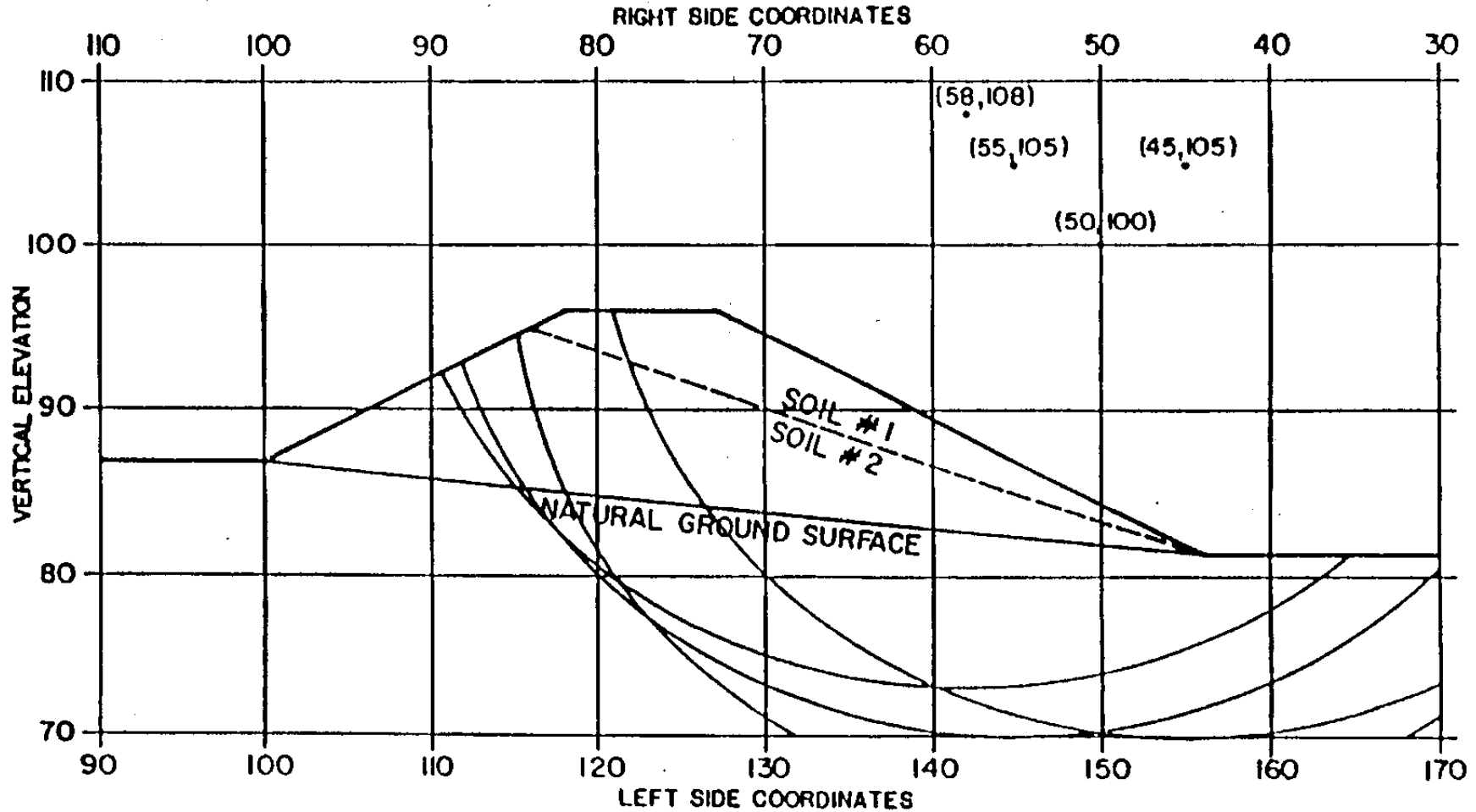
CO-OP MINING COMPANY

SCALE 1" = 10'



BEAR CREEK CANYON MINE - SEDIMENTATION POND "A"

CROSS SECTION THROUGH EMBANKMENT



RADIUS = 35'

CO-OP MINING COMPANY

SCALE 1" = 10'

"SLOPE"

A slope stability program utilizing the simplified or "modified Bishop" method.

The program was written by John P. Cross, P.E., Processing Manager of STS Consultants, Northbrook, Illinois. This program was printed in the October 1982 issue of "CIVIL ENGINEERING."

This version was copied from "CIVIL ENGINEERING" and edited for the Hewlett-Packard 9845 desk-top computer by Horrocks Engineers in March 1983. The format for the input and the output was changed from the original version, however, the program itself was not changed.

HORROCKS ENGINEERS
ONE WEST MAIN STREET
AMERICAN FORK, UTAH 83003
TELEPHONE (801)756-7628

```

42  OPTION BASE 1
44  OVERLAP
46  PRINTER IS 16
48  PRINT "SLOPE STABILITY ANALYSIS"
50  DIM P(50,2),L(50,3),S2(5,4),A(50),F(50,7),Z(50,4),H$(80),Sbits(0:1)(3)
52  INTEGER Logo(2)
54  Sbits(1)=" NO"
56  Sbits(0)="YES"
58  S9=10
59  J6=0
60  OUTPUT 5;"R"
62  ENTER 5;M,D,Times
64  Dates=VAL$(M)&"/"&VAL$(D)&"/83"
66  PRINTER IS 0
68  PRINT "",LIN(4),TAB(80-LEN(Dates));Dates,LIN(0);
70  GOSUB Logo ! PRINT HORROCKS ENGINEERS' LOGO
72  PRINT LIN(5),TAB(28),"SLOPE STABILITY ANALYSIS",LIN(2),TAB(38),"for",LIN(2);

```

*** INPUT OF PROGRAM VARIABLES ***

```

78  INPUT "ENTER THE DATA FILE NAME",Files
79  INPUT "ENTER THE PROJECT NUMBER",Pns
82  INPUT "ENTER THE USER'S INITIALS",Users
106 LINK Files,5000
108 READ H$
110 PRINT TAB(40-LEN(H$)/2);H$
112 PRINT LIN(30),TAB(30),"DATA FILE: "&CHR$(34)&Files&CHR$(34),LIN(1)
114 PRINT TAB(25),"PROJECT NUMBER: "&Pns,LIN(1)
116 PRINT TAB(37),"by: "&Users
118 PRINTER IS 16
120 READ S0
122 IF S0=0 THEN 270
124 READ S6
126 READ S7
128 READ W0
130 READ E1
132 READ P1
134 PRINTER IS 16
136 PRINT "POINT      X-ORD      Y-ORD"
138 FOR I=1 TO P1
140 PRINT SPA(2),I:

```

```

332 IMAGE 3X,2(7D,3D,2X)
350 READ P(1,1),P(1,2)
371 PRINT USING 332;P(1,1),P(1,2)
380 NEXT I
400 READ L1
401 PRINT LIN(1), "LINE FROM TO SOIL BENEATH"
402 IMAGE 3X,2(4D,3X),2X,2D
410 FOR I=1 TO L1
421 PRINT I;
440 READ L(I,1),L(I,2),L(I,3)
480 PRINT USING 402;L(I,1),L(I,2),L(I,3)
490 NEXT I
510 READ S1
511 PRINT LIN(1), "SOIL UNIT WEIGHT COHESION "LCHRS(210)L" SATURATION"
512 IMAGE 3X,4D,DD,2X,9D,3X,3D,3X,3A
520 FOR I=1 TO S1
531 PRINT I;
550 READ S2(I,1),S2(I,2),S2(I,3),S2(I,4)
610 PRINT USING 512;S2(I,1),S2(I,2),S2(I,3),Sbits(S2(I,4))
620 NEXT I

```

*** CIRCLE DEFINITION ***

```

640 F9=0
641 PRINTER IS 16
650 PRINT "CIRCLE DEFINITION"
660 INPUT "ENTER THE X-ORD, Y-ORD, AND RADIUS OF THE FAIL SURFACE FORMAT X,Y,
R",X,Y,R

```

*** CHECK TO SEE IF CIRCLE EXCEEDS TOP LINE END POINTS ***

```

730 U1=P1
740 FOR I=2 TO P1
750 IF (P(I,1)<P(I-1,1)) AND (U1=P1) THEN 770
760 GOTO 780
770 U1=I-1
780 NEXT I
790 J1=R*R-(P(1,2)-Y)^2
800 J2=R*R-(P(U1,2)-Y)^2
810 IF J1<=0 THEN 830
820 IF (J1>0) AND (P(1,1)>X+SQR(J1)) THEN 860
830 IF J2<=0 THEN 850
840 IF (J2>0) AND (P(U1,1)<X+SQR(J2)) THEN 860
850 GOTO 880
860 DISP "CIRCLE EXCEEDS TOP LINE END POINTS";
870 GOTO 4380

```

*** DEFINE INTERSECTION OF CIRCLE WITH LINES ***

```

890 FOR I=1 TO L1
900 X1=P(L(I,1),1)
910 Y1=P(L(I,1),2)
920 X2=P(L(I,2),1)
930 Y2=P(L(I,2),2)
940 IF X2=X1 THEN 960
950 GOTO 970
960 S=9.99E10
970 IF X2<X1 THEN 990
980 GOTO 1000
990 S=(Y2-Y1)/(X2-X1)

```

```

1010 C1=X1-Y1/S
1020 C2=1/S-2+1
1030 C3=2+C1/S-2+X/S-2+Y
1040 C4=C1-2-2+X+C1+X^2+Y^2-R^2
1050 C5=C3-2-4+C2+C4
1060 IF C5<0 THEN 1080
1070 GOTO 1090
1080 Z(1,1)=0
1090 IF C5<0 THEN 1630
1100 Q1=(-C3+SQR(C5))/(2+C2)
1110 Q2=(-C3-SQR(C5))/(2+C2)
1120 Q3=Q1/S+C1
1130 Q4=Q2/S+C1
1140 GOTO 1240
1150 C5=R^2-(Y-Y1)^2
1160 IF C5<0 THEN 1180
1170 GOTO 1190
1180 Z(1,1)=0
1190 IF C5<0 THEN 1630
1200 Q3=X+SQR(C5)
1210 Q4=X-SQR(C5)
1220 Q1=Y1
1230 Q2=Y1
1240 J1=0
1250 J2=0
1260 IF (ABS(S)<=9.99E9) AND (Q3>=X1) AND (Q3<=X2) THEN 1280
1270 GOTO 1290
1280 J1=1
1290 IF (ABS(S)<=9.99E9) AND (Q4>=X1) AND (Q4<=X2) THEN 1310
1300 GOTO 1320
1310 J2=1
1320 IF (S<-9.99E9) AND (Q1>=Y2) AND (Q1<=Y1) THEN 1340
1330 GOTO 1350
1340 J1=1
1350 IF (S<-9.99E9) AND (Q2>=Y2) AND (Q2<=Y1) THEN 1370
1360 GOTO 1380
1370 J2=1
1380 IF (S>9.99E9) AND (Q1>=Y1) AND (Q1<=Y2) THEN 1400
1390 GOTO 1410
1400 J1=1
1410 IF (S>9.99E9) AND (Q2>=Y1) AND (Q2<=Y2) THEN 1430
1420 GOTO 1440
1430 J2=1
1440 Z(1,1)=J1+J2
1450 IF J1=1 THEN 1470
1460 GOTO 1480
1470 Z(1,2)=Q3
1480 IF J1=1 THEN 1500
1490 GOTO 1510
1500 Z(1,3)=Q1
1510 IF (J1=0) AND (J2=1) THEN 1530
1520 GOTO 1540
1530 Z(1,2)=Q4
1540 IF (J1=0) AND (J2=1) THEN 1560
1550 GOTO 1570
1560 Z(1,3)=Q2
1570 IF (J1=1) AND (J2=1) THEN 1590
1580 GOTO 1600
1590 Z(1,4)=Q4
1600 IF (J1=1) AND (J2=1) THEN 1620
1610 GOTO 1630
1620 Z(1,3)=Q2
1630 NEXT I
1640 X4=0
1650 X5=9.99E20
1660 I1=1

```

```

2270 FOR I=1 TO Q1-1
2280 Q3=A(I+1)-A(I)
2290 Q4=INT(Q3/Q2)+1
2300 C1=Q3/Q4
2310 C2=A(I)
2320 FOR J=1 TO Q4
2330 IF J<Q4 THEN 2350
2340 GOTO 2360
2350 I1=I1+1
2360 IF J<Q4 THEN 2380
2370 GOTO 2390
2380 A(I1)=C2+C1
2390 IF J<Q4 THEN 2410
2400 GOTO 2420
2410 C2=C2+C1
2420 NEXT J
2430 NEXT I
2440 FOR I=1 TO I1
2450 FOR J=1 TO I1-1
2460 IF A(J+1)>A(J) THEN 2500
2470 J1=A(J+1)
2480 A(J+1)=A(J)
2490 A(J)=J1
2500 NEXT J
2510 NEXT I

```

*** DEFINE SOIL PARAMETERS FOR EACH SLICE ***

```

2530 F1=I1-1
2540 FOR I=1 TO F1
2550 F(I,4)=A(I+1)-A(I)
2560 X6=F(I,4)
2570 F(I,7)=(A(I+1)+A(I))/2
2580 X3=F(I,7)
2590 Y1=Y-SQR(R^2-(A(I)-X)^2)
2600 Y2=Y-SQR(R^2-(A(I+1)-X)^2)
2610 A5=ATH(ABS(Y2-Y1)/F(I,4))
2620 IF Y2<Y1 THEN 2640
2630 GOTO 2650
2640 A5=-A5
2650 F(I,2)=A5
2660 IF A5=0 THEN 2680
2670 GOTO 2690
2680 F(I,2)=1.0E-5
2690 Y3=Y-SQR(R^2-(X3-X)^2)
2700 I4=0
2710 FOR J=1 TO L1
2720 L5=L(J,1)
2730 L6=L(J,2)
2740 IF (P(L5,2)<=Y3) AND (P(L6,2)<=Y3) THEN 2840
2750 IF (P(L5,1)<X3) AND (P(L6,1)<X3) THEN 2840
2760 IF (P(L5,1)>X3) AND (P(L6,1)>X3) THEN 2840
2770 Y6=P(L5,2)+(P(L5,2)-P(L6,2))/(P(L5,1)-P(L6,1))*(X3-P(L5,1))
2780 IF Y6<=Y3 THEN 2840
2790 I4=I4+1
2800 Z(I4,1)=Y6
2810 Z(I4,2)=L(J,3)
2820 W=0
2830 E=0
2840 NEXT J
2850 IF I4=1 THEN 2970
2860 FOR J=1 TO I4
2870 FOR J1=1 TO I4-1
2880 IF Z(J1,1)>Z(J1+1,1) THEN 2950

```

```

2900      L5=Z(J1,1)
2910      Z(J1,1)=Z(J1+1,1)
2920      Z(J1,2)=Z(J1+1,2)
2930      Z(J1+1,1)=L5
2940      Z(J1+1,2)=L6
2950  NEXT J1
2960  NEXT J
2970  I4=I4+1
2980  Z(I4,1)=Y3
2990  FOR J1=1 TO I4-1
3000      IF (I=1) AND (J1=1) AND (X3)=S6 THEN 3020
3010      GOTO 3030
3020      I6=S8-Y1
3030      IF (I=F1) AND (J1=1) AND (X3)=S6 AND (X3<=S7) THEN 3050
3040      GOTO 3060
3050      J6=S8-Y2
3060      W=W+(Z(J1,1)-Z(J1+1,1))*X6+S2(Z(J1,2),1)
3070      IF (Z(J1,1)<S0) AND (X3)=S6 AND (X3<=S7) THEN 3090
3080      GOTO 3100
3090      W=W+(S0-Z(J1,1))*X6+W0
3100      IF S2(Z(J1,2),4)>.95 THEN 3120
3110      GOTO 3130
3120      E4=S2(Z(J1,2),1)
3130      IF S2(Z(J1,2),4)<.95 THEN 3150
3140      GOTO 3160
3150      E4=S2(Z(J1,2),1)-W0
3160      E=E+(Z(J1,1)-Z(J1+1,1))*X6+E4
3170  NEXT J1
3180  F(I,1)=W
3190  F(I,5)=E
3200  F(I,3)=S2(Z(I4-1,2),2)
3210  F(I,6)=2*PI*(S2(Z(I4-1,2),3)/360)
3220  NEXT I
3221  NORMAL
3230  IF F9=0 THEN 3360
3240  PRINT USING 3250;CHR$(210)
3250  IMAGE "SLICE  WEIGHT  INCLINATION  COHESION  WIDTH  EFF WEIGHT  *A
      "
      "
3280  D=360/(2*PI)
3290  FOR I=1 TO F1
3300      PRINT USING 3320;I,F(I,1),F(I,2)*0,F(I,3),F(I,4),F(I,5),F(I,6)*0,F(I,7)
3320      IMAGE 3D,10D.D,7D.D,12D,9D.D,11D.D,7D,7D.D
3340  NEXT I
3350  PRINT
3360  D=0
3361  PRINTER IS 0
3370  FOR I=1 TO F1
3380      D=D+F(I,1)*SIN(ABS(F(I,2)))*(F(I,2)/ABS(F(I,2)))
3390      D=D+E1+F(I,1)*COS(ABS(F(I,2)))
3400  NEXT I
3410  IF I6>0 THEN 3430
3420  GOTO 3440
3430  I7=W0*I6+I6*(R-I6/3)/(2*R)
3440  IF I6>0 THEN 3460
3450  GOTO 3470
3460  D=D-SGN(D)*I7
3470  IF (I6>0) AND (F9=1) THEN 3490
3480  GOTO 3510
3490  PRINT USING 3500;I7
3500  IMAGE "DRIVING FORCE COUNTER BALANCE OF",10D.2D
3510  IF J6>0 THEN 3530
3520  GOTO 3540
3530  I7=W0*J6+J6*(R-J6/3)/(2*R)
3540  IF J6>0 THEN 3560
3550  GOTO 3570
3560  D=D-SGN(D)*I7

```

```

3500 GOTO 3610
3590 PRINT USING 3600;I7
3600 IMAGE "DRIVING FORCE INCREASE OF",10D.2D

```

*** ITERATIVE SOLUTION FOR FACTOR OF SAFETY ***

```

3620 F0=1
3630 R4=0
3640 I6=0
3650 FOR I=1 TO F1
3660   R1=F(I,3)+F(I,4)+F(I,5)*TAN(F(I,6))
3670   R2=1/COS(ABS(F(I,2)))
3680   R3=1+TAN(F(I,6))*TAN(F(I,2))/F0
3690   R4=R4+R1*(R2/R3)
3700 NEXT I
3710 F2=R4/D
3720 I6=I6+1
3730 IF F9=1 THEN 3750
3740 GOTO 3820
3750 IF I6=1 THEN 3770
3760 GOTO 3800
3770 PRINT
3780 PRINT USING 3790
3790 IMAGE "ITERATION",11X,"INITIAL",10X,"CALCULATED"
3800 PRINT USING 3810;I6,F0,F2
3810 IMAGE 3X,3D,13X,3D.4D,12X,3D.4D
3820 IF I6>10 THEN 3840
3830 GOTO 3850
3840 PRINT "WILL NOT CLOSE"
3850 IF I6>10 THEN 3970
3860 IF ABS(ABS(F0)-ABS(F2))<.005 THEN 3900
3870 F0=ABS(F2)
3880 R4=0
3890 GOTO 3650
3900 !
3901 IF NOT F9 THEN
3902   PRINTER IS 16
3903 ELSE
3904   PRINTER IS 0
3905 END IF
3910 PRINT
3920 PRINT USING 3930;F2,X,Y,R
3930 IMAGE "FACTOR OF SAFETY=",5D.2D," AT X=",4D," Y=",4D," R=",4D
3940 PRINT USING 3950;E1
3950 IMAGE "EARTHQUAKE=",2D.2D
3951 IF F9 THEN 4380
3960 PRINT
3961 AS=""
3970 INPUT "DO YOU WISH A FORMAL PRINTOUT (Y/N)",AS
3980 IF UPC$(AS(1,1))="N" THEN 4320
3991 PRINTER IS 0
4030 IMAGE 0"WATER UNIT WEIGHT=",3D.2D
4040 PRINT USING 4030;W0
4041 IF S0 THEN
4050   PRINT
4060   IMAGE "SUBMERGENCE AT "3D.2D," FROM ",3D.1D," TO ",3D.1D
4070   PRINT USING 4060;S0,S6,S7
4071 END IF
4080 PRINT
4090 PRINT " POINT X-ORD Y-ORD"
4100 IMAGE 4D,7D.2D,7D.2D
4110 FOR I=1 TO P1
4120   PRINT USING 4100;I,P(I,1),P(I,2)
4130 NEXT I
4140 PRINT

```

```

4150 PRINT "LINE LEFT RIGHT DIST"
4160 IMAGE 4,5D
4170 FOR I=1 TO L1
4180 PRINT USING 4160;I,L(I,1),L(I,2),L(I,3)
4190 NEXT I
4200 PRINT
4210 PRINT "SOIL UNIT WEIGHT COHESION "ECHR$(210)2" SATURAT
ED"
4220 IMAGE 3D,15D,17D,9D,7X,3A
4230 FOR I=1 TO S1
4240 PRINT USING 4220;I,S2(I,1),S2(I,2),S2(I,3),Sbils(S2(I,4))
4250 NEXT I
4260 PRINT
4270 PRINT "CIRCLE X-ORD Y-ORD RADIUS FACTOR OF SAFETY"
4280 IMAGE 12D,D,7D,D,7D,D,8D,2D
4290 PRINT USING 4280;X,Y,R,F2
4300 PRINT
4310 PRINT
4311 A$=""
4320 INPUT "DO YOU WISH A DIAGNOSTIC RUN (Y/N)",A$
4340 IF UPC$(A$(1,1))="N" THEN 4370
4350 F9=1
4370 IF UPC$(A$(1,1))<>"N" THEN 720
4371 A$=""
4380 INPUT "DO YOU WANT TO CONTINUE (Y/N)",A$
4400 IF UPC$(A$(1,1))<>"N" THEN 630
4401 DISP " FINISHED "
4410 STOP
4520 Logo:PLOTTER IS 13,"GRAPHICS"
4530 GRAPHICS
4540 SCALE 0,559,0,454
4550 LORG 2
4560 FOR I=0 TO 5
4570 Logo(1)=-2175
4580 Logo(2)=-4352
4590 R=454-I
4600 GLOAD Logo(*),0,R
4610 NEXT I
4620 FOR I=6 TO 14
4630 Logo(1)=-2115
4640 Logo(2)=-4352
4650 R=454-I
4660 GLOAD Logo(*),0,R
4670 NEXT I
4680 FOR I=15 TO 21
4690 Logo(1)=-2175
4700 Logo(2)=-4352
4710 R=454-I
4720 GLOAD Logo(*),0,R
4730 NEXT I
4740 CSIZE 15/4.54,9/15
4750 MOVE 27,450
4760 LABEL "HORROCKS"
4770 MOVE 27,437
4780 CSIZE 15/4.54,8/15
4790 LABEL "ENGINEERS"
4800 DUMP GRAPHICS 430,454
4810 GCLEAR
020 EXIT GRAPHICS
330 RETURN

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Slope stability program

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FOR NATURAL OR man-made slopes, the index of stability with respect to a sudden failure is known as the safety factor of the slope. The safety factor may be defined as the ratio of the potential resisting forces to the drive forces tending to cause movement. A slope on the verge of failure would have a safety factor of 1.0. The analysis of slope stability is, therefore, the analytical procedure of determining the most critical, i.e., the lowest, factor of safety of given or proposed slope.

Manual methods of slope stability analysis were developed prior to the advent of the electronic computer. These approaches resulted in high analysis costs and conservative slope configurations. Repetitive calculations lent themselves to computerized methods and numerous programs exist that have been written for large computer systems to perform slope stability analysis according to a number of theoretical methods.

The simplified or modified Bishop method is reasonably accurate for most purposes where the slope under analysis can be assumed to fail along a circular failure surface. The factor of safety is defined as the ratio of the resisting moments to driving moments around the center of the failure arc. Initially, a cross-section of the slope is drawn detailing soil strata and piezometric surfaces. A center point is then chosen from which an arc is taken through the cross-section. This arc represents the failure surface under evaluation. This failure zone is broken down into a series of slices which can be individually evaluated for their weight and strength characteristics. An illustration of a slope cross-section being defined by a series of slices is shown in Figure 1.

The forces acting on each slice are illustrated in Figure 1, where ΔX is the width of the slice, W is the weight of the slice, T is the force acting along the failure surface at the bottom of the slice, N is the effective force acting normally to the base of the slice and θ is the inclination of the failure surface or slice base. The factor of safety is defined as:

$$F = \frac{\sum (C \Delta X + N \tan \phi) \sec \theta}{\sum W \sin \theta}$$

Where C is the cohesion, ϕ is the friction angle and the summation occurs over each slice of the failure zone. As the factor of safety, F , occurs on both sides of the equation. An interactive solution where F is initially estimated and then back substituted until the calculated F and estimated F close within a specified tolerance.

The equation can be modified to handle two additional conditions by adding additional factors to the term defining the driving force. These two conditions are standing pools, i.e., submergence of a portion of the slope, and earthquake loading. For submergence, the weight of water acting above the slice is added to the weight of the slice itself. The total driving force is increased or de-

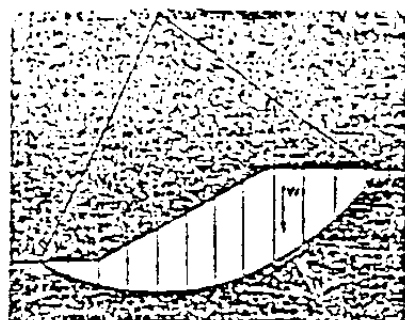


Figure 1. Failure zone is divided into slices; forces acting upon a slice are indicated.

creased by the weight of water above or below the exit of the failure surface from the slope. The second condition of earthquake loading can be handled by increasing the driving force calculated for each slice by $E W \cos \theta$, where E is the earthquake loading factor. Similarly the resisting force is decreased by a decrease in the normal force due to the earthquake loading.

Following the calculation of the safety factor for this arc, the center or radius of the arc is modified to generate a new failure surface. The previously mentioned procedure is again followed with a new factor of safety being deter-

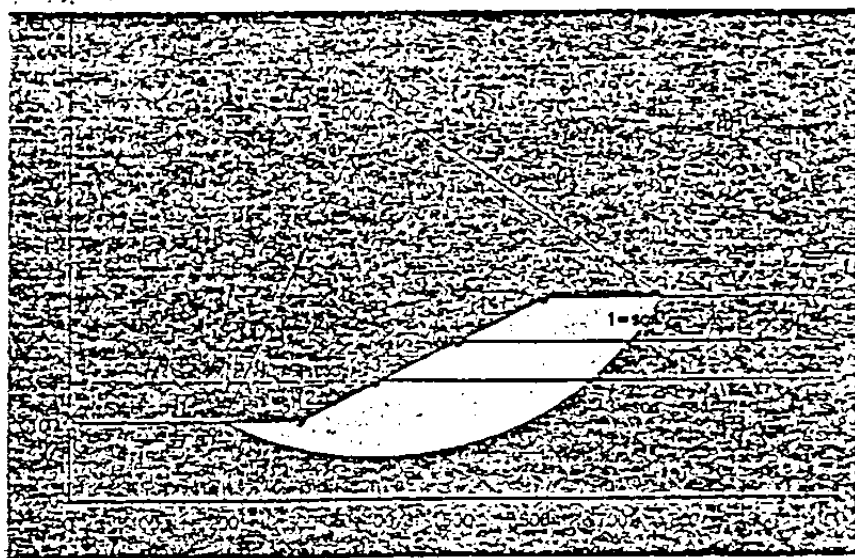


Figure 2. shows a typical cross-section and the input parameters required to define the cross-section for the program.

Table for Figure 2.											
Point	X	Y	Line	Left	Right	Soil	Soil	α	Cohesion	Φ	Saturated
1	0	100	1	1	2	3	1	127	2000	20	No
2	300	100	2	2	3	3	2	130	1000	33	No
3	400	150	3	3	4	2	3	130	1000	33	Yes
4	500	200	4	4	5	1					
5	800	250	5	5	6	1					
6	1000	250	6	4	7	2					
7	1000	200	7	3	8	3					
8	1000	150									

```

100 DIM X(100), Y(100), Z(100), S(100), T(100), U(100), V(100), W(100),
110 DIM C(100), D(100), E(100), F(100), G(100), H(100), I(100), J(100),
120 DIM K(100), L(100), M(100), N(100), O(100), P(100), Q(100), R(100),
130 DIM S1(100), S2(100), S3(100), S4(100), S5(100), S6(100), S7(100),
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Additional information that must be supplied includes the unit weight of water, the earthquake loading factor and information defining any standing pool of water. This pool is specified by inputting the Y-coordinate of the pool elevation and the left and right X-coordinates defining the extent of the pool. The only remaining input parameters are the center coordinates and radius of

A computerized evaluation of slope stability should never take place apart from a complete evaluation of the geophysical conditions involved. Likewise, the results should always be subjected to evaluation and interpretation based on current engineering practice and experience.

Cross received his M.S. degree in civil engineering from Rose-Hulman Institute of Technology, Terre Haute, Indiana in 1972. Currently data processing manager/project engineer, Cross has been with STS (formerly Soil Testing Services) for 10 years; He holds a Master of Divinity from Trinity Evangelical Divinity School and is working on an MBA at the Keller Graduate School of Management.